BACKGROUND INFORMATION REPORT FOR QUINQUENNIAL REVIEW TEAM

ICAR-Agricultural Technology Application Research Institute, Zone-VII
Umiam, Meghalaya-793103
(An ISO 9001:2015 certified organization)

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for

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(2011-12 to 2018-19)

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Citation

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Foreword

The present report is the outcome of the synthesis of hard work and achievements accomplished by ICAR- Agricultural Technology Application Research Institute, Zone – VII, Umiam during the period of 2011-12 to 2018-19. The objective of this report is to provide information in systematic manner to the committee constituted for the Quinquennial review of ICAR- Agricultural Technology Application Research Institute, Zone – VII, Umiam. This background information report provides a detail overview of organizational setup, technical achievements, human resource development initiatives and other accomplishments of ICAR-ATARI, Umiam.

Through this report we have tried our best to communicate the variety of activities conducted by ICAR-ATARI, Umiam through the implementation of various flagship programs of Government of India that are meant to support the farmers and rural youth residing in this Zone. The summary of various mandated activities, year wise and state wise information is also presented for the better understanding.

I appreciate the efforts of scientific staff and project staff of ICAR-ATARI, Umiam for completing this report in stipulated time.

Place: Umiam, Meghalaya (Bidyut C. Deka)
Date: 14.10.2019 Director

Executive summary

The ICAR-Agricultural Technology Application Research Institute (ATARI), Umiam with its headquarters at Umiam, Meghalaya is primarily responsible for monitoring and reviewing the technology assessment, refinement, demonstration, training programmes and other extension activities conducted by 43 KVKs that are spread across five northeastern states namely Manipur, Meghalaya, Mizoram, Nagaland and Tripura. At present KVKs under ICAR-ATARI, Umiam have 522 staff out of 687, which accounts for 75.98% of sanctioned strength. Most of the vacant posts are lying vacant in KVKs administered by ICAR institutes.

During the review period ICAR-ATARI, Umiam has completed six in-house research projects and six externally funded projects besides accomplishing other routine activities. ICAR-ATARI, Umiam is constantly engaging with its stakeholders through various special programs, and outreach programs that are implemented by the KVKs. Keeping in view the priorities of doubling farmers' income more than 15000 households are identified to implement scientific interventions of proven technologies through OFTs and FLDs. The Institute is also attempting to implement various programs to promote integrated farming, organic farming, water and soil conservation, tree plantation drives, animal vaccination camps etc. for empowering the farming communities of the region

During 2011-12 to 2018-19, the KVKs under ICAR-ATARI, Umiam have assessed 2565 technologies through 10840 trials in crop related enterprises and 987 technologies through 5524 trials in livestock related enterprises. In order to double the farmers' income in the NER, ICAR-ATARI, Umiam (Zone-VII) has identified 30 suitable technologies and these technologies are being spread by KVKs on priority across different states of the region. Moreover, KVKs have conducted 6892 frontline demonstrations that spread across 9923.75 hectares.

Besides, KVKs of this zone have trained more than five lakh (509230) individuals through 17990 course to benefit farmers, rural youth and extension personnel. Similarly, during review period, more than 17 lakh farmers are benefited through various extension activities. Moreover, KVKs have produced a total of 49361q of seeds, which consists of 22272q of cereals, around 7000q of oilseeds, 7764 q of pulses and seeds of various spices, vegetables, tubers, etc. In order to promote livestock farming in the NER, KVKs

produced and distributed 67 lakh fish fingerlings, 1991 piglets, 1.2 crore poultry birds, 421 goats and 2184 rabbits during the review period.

Moreover, during review period KVKs of this zone tested 58431 numbers of soil samples, 1017 water samples and 2173 plant samples that benefited 82613 farmers residing in 2865 villages of NER. Based on soil sampling by KVKs, 61379 soil health cards are issued that benefited 64689 number of farm families.

In addition, the KVKs are constantly in touch with farmers through ICTs, and mobile messaging is being used for advisory services. During the review, period KVKs of this zone have sent 1242570 number of messages, which consists of 622468 text messages, 152515 voice messages, and 42009 voice-cum text messages that helped 665509 farmers in NER so as to help them in making appropriate farming related decisions. Besides, all the KVKs of the zone are also engaged in various flagship programmes like CFLD in oil Seeds and Pulses, PKVY, PMFBY, PM-KISAN, NADCM, *Jal Shakti Abhiyan*, *Krishi Kalyan Abhiyan* and other programmes announced by Govt. of India time to time.

Contents

Historical Background of ICAR-ATARI

History

The Indian Council of Agricultural Research created 8 (Eight) Zonal Coordinating Units with a staff strength of 6 (Six) in each unit for implementation of Lab-to-land programme covering 50,000 farm families over the entire country during 1979. Subsequently, the ICAR decided that the KVK Project would be monitored by these units and increased the staff strength to 8 (Eight). During the VIIIth Plan (1992-1997), when the total number of KVKs was 261, the ICAR revised the staff strength of Zonal Coordinating Unit to 15 (Fifteen). During the XIth Plan, on an average, each Zonal Coordinating Unit had to handle an annual budget of about Rs. 55 crores. For proper management of large number of KVKs, the Zonal Coordinating Units were upgraded to the status of Project Directorate, called Zonal Project Directorate (ZPD) with total sanctioned staff strength of 17 wef March 19, 2009. The ZPD was subsequently elevated to the level of research institute called Agricultural Technology Application Research Institute (ATARI) in August 11, 2015 keeping in view of its revised mandates.

ICAR-Agricultural Technology Application Research Institute (ATARI), Umiam, Zone-VII

The ICAR-Agricultural Technology Application Research Institute (ATARI), Zone-VII with its headquarters at Umiam, Meghalaya is primarily responsible for monitoring and reviewing the technology assessment, refinement, demonstration, training programmes and other extension activities conducted by KVKs in North East Hills Region, which comprises of five states of Manipur, Meghalaya, Mizoram, Nagaland and Tripura. Besides, the institute is also engaged in providing guidance to the KVKs to accomplish its technical activities, ensuring flow and access of technologies to the KVKs, enabling the Directorate of Extension Education of CAU, Imphal in the zone to oversee the activities of KVKs. The ICAR-ATARI, Umiam also takes up need based Human Resource Development (HRD) programmes for KVK staff with adequate financial support, liaison with different stakeholders and other line departments in the region. Presently the zone has 43 KVKs under 12 different host institutes in 5 NEH states, viz., Manipur, Meghalaya, Mizoram, Nagaland and Tripura.

Mandate of ICAR-ATARI

The revised mandates of ICAR-ATARI are as follows

- Coordination and monitoring of technology application and frontline extension education programmes, and
- Strengthening agricultural extension research and knowledge management.

Organizational structure of ICAR-ATARI, Umiam (Zone-VII)

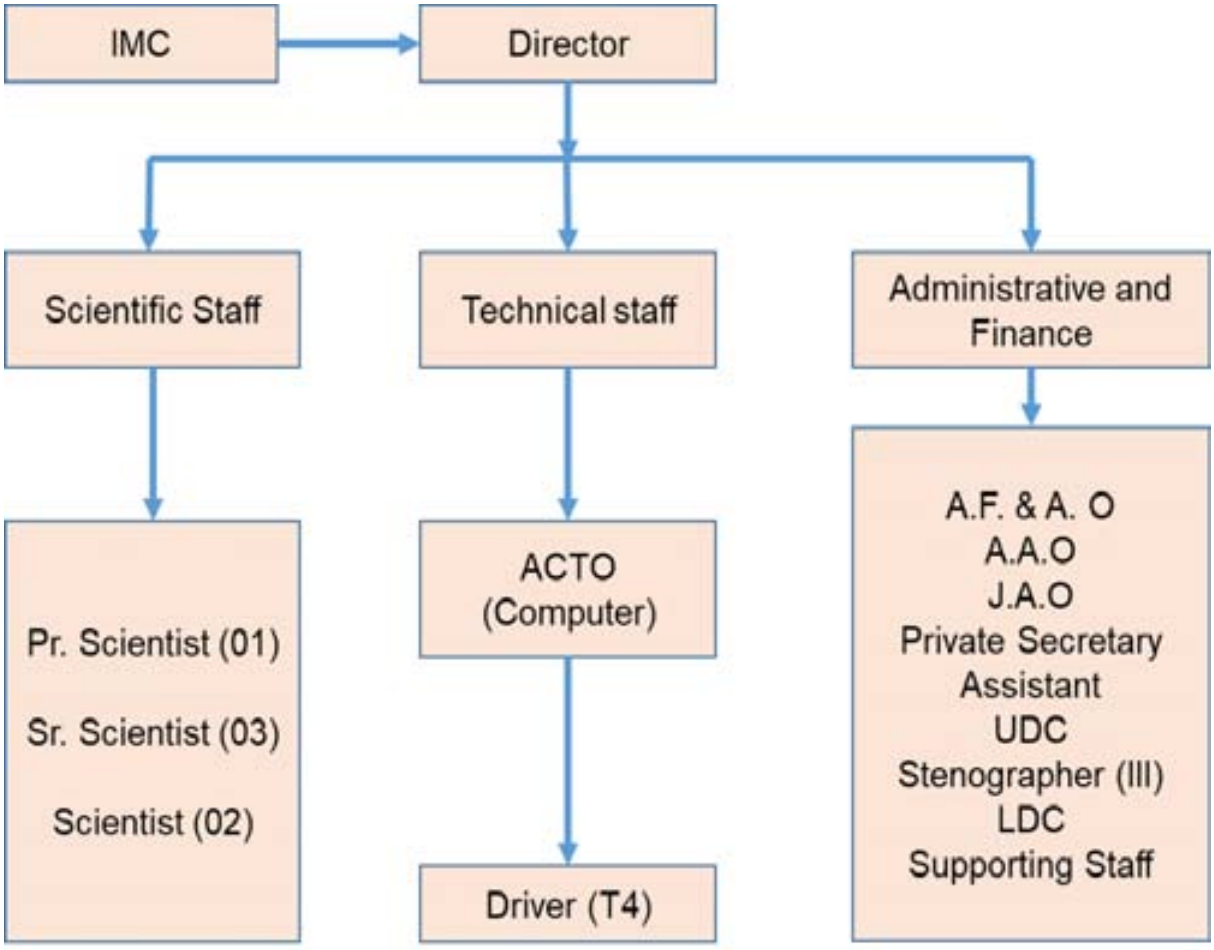


Figure A. Organizational structure of ICAR-ATARI, Umiam

Staff Position of Agricultural Technology Application Research Institute (ATARI), Umiam, Zone-VII

Out of the sanctioned staff strength of 20, presently the Agricultural Technology Application Research Institute, Umaim has 14 staff in position. The details of the staff position of the institute are given in table below.

Table 1. Staff position of ICAR-ATARI, Umiam

Sl. No.	Category	Sanctioned Strength	In Position	Vacant
1.	Director	1	1	0
2.	Scientific Post			
	Principal Scientist	1	1	0
	Senior Scientist	3	1	2
	Scientist	2	2	0
	Total	6	4	2
3.	Technical Staff			
	Asst. Chief Technical Officer	1	1	0
	Driver	1	1	0
	Total	2	2	0
4.	Administrative Post			
	Assistant Finance & Accounts Officer	1	1	0
	Assistant Administrative Officer	1	0	1
	Private Secretary	1	1	0
	Junior Accounts Officer	1	0	1
	Assistant	1	0	1
	U.D.C	1	1	0
	Stenographer Grade-III	1	1	0
	LDC	2	0	2
	Total	9	4	5
5.	Supporting Staff			
	(SSG-I, II, III, IV)	2	2	0
	Total	20	13	7

Growth of KVKs under ICAR-ATARI, Umiam

The first KVK in the region was established in Kolasib district of Mizoram in February, 1979 to impart training to equip the farmers with skill and knowledge required for practicing advanced agricultural and allied practices by the farmers. Gradually with the increase in number, the sphere of KVKs also widened to shoulder other responsibilities like conducting front line demonstrations, on-farm trials, providing trainings to other

stakeholders etc. During the IX the plan, the zone had only 13 KVKs with most of them were under ICAR administration. Presently the Zone-VII has 43 KVKs spread over five states of the region under the administrative control of 12 host institutes. Out of the total number of KVKs in the zone, 14 KVKs are with ICAR Research Complex, Umiam, 19 with State Department of Agriculture, 5 with Central Agricultural University, Imphal, 1 with Nagaland University, 1 with National Research Centre (NRC) on Mithun, Nagaland and 3 with Non-Government Organizations (NGOs) respectively.

State-wise distribution of KVKs under ICAR-ATARI, Umiam

Table 2. State wise distribution of KVKs under ICAR-ATARI, Umiam, Zone-VII

State	KVKs (No.)	Host Institutions
Manipur (9)	1	JCPCS Utlou, Manipur (NGO)
	5	ICAR RC for NEH Region, Barapani
	1	CAU Imphal, Manipur
	1	FEEDS, Hengbung (NGO)
	1	State Dept. of Agriculture
Meghalaya (7)	3	State Dept. of Agriculture
	2	ICAR RC for NEH Region, Barapani
	2	CAU Imphal, Manipur
Mizoram (8)	1	CAU Imphal, Manipur
	7	State Dept. of Agriculture Education and Research
Nagaland (11)	5	ICAR RC for NEH Region, Barapani
	4	State Dept. of Agriculture
	1	NRC on Mithun
	1	Nagaland University
Tripura (8)	4	State Dept. of Agriculture
	2	ICAR RC for NEH Region, Barapani
	1	Rama Krishna Seva Kendra (NGO), Kolkata
	1	CAU Imphal, Manipur
Total	43	

Manpower and Infrastructural Facilities in KVKs of Zone-VII

Presently the KVKs under ICAR-ATARI, Umiam have a total of 522 staff out of 687 sanctioned strength in different positions like Sr. Scientist & Head, Subject Matter Specialist, Programme Assistant, Assistant, Superintendant, Stenographer Grade III, Driver and Supporting Staff (Table 4), accounting 75.98% of the total sanctioned strength. The remaining vacancies of different cadres are in the process of recruitment by the concerned host institutes. The State-wise and KVK-wise present staff position of KVKs under ICAR-ATARI, Umiam is given in Table below.

Table 3 Manpower at different KVKs of Zone-VII

Statement on Manpower at different KVKs																																
S. No.	Name of the State	Name of the KVK	Name of the Host Organization	Sr. Scientist and Head			Subject Matter Specialist/T-6			Farm Manager/ T-4			Program Assistant (computer)/ T-4			Program Assistant (lab technician) / T-4			Assistant			Stenographer grade III			Driver/T-1			Skilled Support Staff			Total		
				(Status of posts)			(Status of posts)			(Status of posts)			(Status of posts)			(Status of posts)			(Status of posts)			(Status of posts)			(Status of posts)			(Status of posts)			(Status of posts)		
				S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V
1	Manipur	Bishnupur	NGO	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
2	Manipur	Churachandpur	ICAR	1	0	1	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	2	2	0	2	2	0	16	13	3
3	Manipur	Imphal East	CAU	1	0	1	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	2	2	0	2	2	0	16	14	2
4	Manipur	Imphal West	ICAR	1	0	1	6	5	1	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	2	2	0	2	2	0	16	12	4
5	Manipur	Senapati	NGO	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	0	0	16	14	0
6	Manipur	Tamenglong	ICAR	1	1	0	6	7	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	17	0
7	Manipur	Thoubal	SG	1	1	0	6	5	1	1	1	0	1	1	0	1	0	1	1	1	0	1	1	0	2	2	0	2	2	0	16	14	2
8	Manipur	Ukhrul	ICAR	1	1	0	6	6	0	1	1	0	1	1	0	1	0	1	1	0	1	1	1	0	2	1	1	2	2	0	16	13	3
9	Manipur	Chandel	ICAR	1	1	0	6	6	0	1	1	0	1	1	0	1	0	1	1	1	0	1	0	1	2	2	0	2	2	0	16	14	2

		Total		**9**	**6**	**3**	**54**	**53**	**2**	**9**	**9**	**0**	**9**	**9**	**0**	**9**	**6**	**3**	**9**	**5**	**4**	**9**	**6**	**3**	**18**	**17**	**1**	**18**	**16**	**0**	**144**	**127**	**16**
1	Meghalaya	East Khasi Hills	SG	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1
2	Meghalaya	Jaintia Hills	SG	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	2	2	0	2	2	0	16	15	1
3	Meghalaya	Ri-Bhoi	ICAR	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	0	1	2	1	1	2	0	2	16	11	5
4	Meghalaya	West Garo Hills	ICAR	1	0	1	6	3	3	1	0	1	1	1	0	1	1	0	1	1	0	1	0	1	2	2	0	2	2	0	16	10	6
5	Meghalaya	West Khasi Hills	SG	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1
6	Meghalaya	South Garo Hills	CAU	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	2	2	0	2	2	0	16	15	1
7	Meghalaya	East Garo Hills	CAU	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	2	2	0	2	2	0	16	15	1
		Total		**7**	**6**	**1**	**42**	**37**	**5**	**7**	**6**	**1**	**7**	**7**	**0**	**7**	**7**	**0**	**7**	**3**	**4**	**7**	**5**	**2**	**14**	**13**	**1**	**14**	**12**	**2**	**112**	**96**	**16**
1	Mizoram	Aizawl	CAU	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	0	1	1	1	0	2	2	0	2	2	0	16	15	1
2	Mizoram	Champai	SG	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
3	Mizoram	Kolasib	SG	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
4	Mizoram	Lawngtlai	SG	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
5	Mizoram	Lunglei	SG	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1
6	Mizoram	Mamit	SG	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1
7	Mizoram	Saiha (Chimtuipui)	SG	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1
8	Mizoram	Serchipp	SG	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	15	1
		Total		**8**	**8**	**0**	**48**	**44**	**4**	**8**	**8**	**0**	**8**	**8**	**0**	**8**	**8**	**0**	**8**	**7**	**1**	**8**	**8**	**0**	**16**	**16**	**0**	**16**	**16**	**0**	**128**	**123**	**5**
1	Nagaland	Dimapur	ICAR	1	0	1	6	5	1	1	1	0	1	1	0	1	0	1	1	0	1	1	1	0	2	1	1	2	1	1	16	10	6
2	Nagaland	Kohima	SG	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
3	Nagaland	Mokokchung	SG	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0

4	Nagaland	Mon	SG	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
5	Nagaland	Phek	ICAR	1	0	1	6	5	1	1	1	0	1	1	0	1	0	1	1	1	0	1	1	0	2	1	1	2	2	0	16	12	4
6	Nagaland	Tuensang	SG	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
7	Nagaland	Wokha	ICAR	1	1	0	6	4	2	1	0	1	1	0	1	1	0	1	1	0	1	1	1	0	2	2	0	2	1	1	16	9	7
8	Nagaland	Zunhebotto	CU	1	1	0	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
9	Nagaland	Longleng	ICAR	1	1	0	6	2	4	1	0	1	1	1	0	1	1	0	1	0	1	1	1	0	2	0	2	2	1	1	16	7	9
10	Nagaland	Kiphire	ICAR	1	0	1	6	0	6	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	2	2	0	2	16	0	16
11	Nagaland	Peren	ICAR	1	0	1	6	2	4	1	1	0	1	0	1	1	0	1	1	0	1	1	0	1	2	0	2	2	0	2	16	3	13
		Total		**11**	**7**	**4**	**66**	**48**	**18**	**11**	**8**	**3**	**11**	**8**	**3**	**11**	**6**	**5**	**11**	**6**	**5**	**11**	**9**	**2**	**22**	**14**	**8**	**22**	**15**	**7**	**176**	**121**	**55**
1	Tripura	South Tripura	ICAR	1	0	1	6	4	2	1	0	1	1	1	0	1	0	1	1	0	1	1	0	1	2	1	1	2	2	0	16	8	8
2	Tripura	Khowai	NGO	1	0	1	6	6	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	2	0	2	2	0	16	16	0
3	Tripura	North Tripura	SG	1	0	1	6	4	2	1	1	0	1	1	0	1	0	1	1	0	1	1	0	1	2	1	1	2	2	0	16	9	7
4	Tripura	Dhalai	SG	1	0	1	6	1	5	1	1	0	1	0	1	1	0	1	1	0	1	1	0	1	2	1	1	2	2	0	16	5	11
5	Tripura	West Tripura	ICAR	1	0	1	6	2	4	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	2	1	0	1	15	2	13
6	Tripura	Gomati	SG	1	0	1	6	0	6	1	0	1	1	0	1	1	0	1	1	1	0	1	0	1	2	0	2	2	0	2	16	1	15
7	Tripura	Unakoti	SG	1	0	1	6	0	6	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	2	0	2	2	0	2	16	0	16
8	Tripura	Sepahijala	SG	1	1	0	6	5	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	2	1	1	2	2	0	16	14	2
		Total		**8**	**1**	**7**	**48**	**22**	**26**	**8**	**4**	**4**	**8**	**4**	**4**	**8**	**2**	**6**	**8**	**3**	**5**	**8**	**2**	**6**	**16**	**6**	**10**	**15**	**10**	**5**	**127**	**55**	**72**
	ATARI Total			**43**	**29**	**14**	**258**	**204**	**55**	**43**	**35**	**8**	**43**	**36**	**7**	**43**	**29**	**14**	**43**	**24**	**19**	**43**	**30**	**13**	**86**	**66**	**20**	**85**	**69**	**14**	**687**	**522**	**164**

Budget allocation to Zone-VII

Statement of Host Institute and sub-headwise break-up of Revised Estimate for 2017-18 in respect of ATARI & KVKs Zone-VII, Umiam (NEH + TSP + Other than NEH & TSP)

Host Institute		Details	Recurring Contingencies							Non Recurring Contingencies					RF	GRAND TOTAL
			Pay & Allow.	TA	HRD	KSHAMTA	NARI	Contig.	TOTAL	Equip./Fur.	Works	Lib	Vehicle	TOTAL		
I	**ATARI, ZONE III / VII**															
	2010-11	RE	67.50	10.00	5.00	0.00	0.00	21.00	103.50	7.10	0.00	0.00	0.00	7.10	0.00	110.60
	2011-12	RE	85.00	12.00	4.00	0.00	0.00	20.00	121.00	5.00	15.00	0.00	0.00	20.00	0.00	141.00
	2012-13	RE	103.00	10.50	4.00	0.00	0.00	13.00	130.50	0.00	0.00	0.00	0.00	0.00	0.00	130.50
	2013-14	RE	112.00	12.00	4.00	0.00	0.00	25.00	153.00	10.00	0.00	0.00	0.00	10.00	0.00	163.00
	2014-15	RE	150.00	15.00	5.00	0.00	0.00	40.00	210.00	0.00	0.00	0.00	8.00	8.00	0.00	218.00
	2015-16	RE	122.61	18.00	5.00	0.00	0.00	45.00	190.61	11.34	0.00	0.00	8.00	19.34	0.00	209.95
	2016-17	RE	163.86	18.00	6.00	0.00	0.00	51.50	239.36	2.00	140.26	0.27	0.00	142.53	0.00	381.89
	2017-18	RE	149.84	19.00	5.00	0.00	0.00	33.51	207.35	0.00	231.95	0.00	0.00	231.95	0.00	439.30
	2018-19	RE	206.13	10.00	2.50	0.00	0.00	46.14	264.77	7.83	89.02	0.00	0.00	96.85	0.00	361.62
II	**KVK, ZONE III / VII**															
	2010-11	RE	4656.11	121.05	4.00	0.00	0.00	549.10	5330.26	138.35	1916.02	6.90	18.00	2079.27	1.00	7410.53
	2011-12	RE	4319.33	99.70	2.00	0.00	0.00	491.55	4912.58	70.50	1642.01	6.90	18.00	1737.41	4.00	6653.99
	2012-13	RE	3453.03	142.70	4.00	0.00	0.00	620.50	4220.23	0.00	849.27	0.00	0.00	849.27	0.00	5069.50
	2013-14	RE	5553.00	151.25	7.75	0.00	0.00	1185.00	6897.00	605.12	237.31	18.77	38.80	900.00	0.00	7797.00
	2014-15	RE	6784.00	133.00	8.00	0.00	0.00	695.32	7620.32	620.45	91.00	19.00	102.80	833.25	0.00	8453.57
	2015-16	RE	7127.39	180.50	11.50	0.00	0.00	1201.00	8520.39	580.66	68.00	0.00	32.00	680.66	0.00	9201.05
	2016-17	RE	8190.04	228.20	130.00	0.00	0.00	1363.50	9911.74	469.71	837.26	58.50	152.00	1517.47	0.00	11429.21
	2017-18	RE	3865.10	86.49	29.00	0.00	0.00	649.50	4630.09	0.00	10.05	0.00	0.00	10.05	0.00	4640.14
	2018-19	RE	5158.50	131.25	47.10	6.40	30.00	715.90	6089.15	27.10	533.00	0.00	40.00	600.10	0.00	6689.25

Action taken report of QRT 2005-06 to 2009-10

The last Quinquennial Review Team (QRT) to review the work done during the period 2005 to 2010 at ICAR-ATARI, Umiam (which was earlier referred as Zonal Project Directorate, Zone-III) comprised of the following:

1. Dr. P.G. Chengappa : Chairman
2. Dr. K.K. Jindal : Member
3. Dr. Y.P.S. Dabas : Member
4. Dr. A.K. Gogoi : Member Secretary

The QRT team has given following recommendations and the action taken on each of these items is given below:

Area	Recommendations	Action Taken
1. Human Resource Management:	a. North East is more dependent on agriculture as compared to rest of the country and as such agricultural extension plays a crucial role for growth of agriculture in the region. Keeping this in view the total sanctioned posts of KVKs need to be increased in order to expand the extension reach. Four more SMSs and two more technical staff may be considered for recruitment at each KVK. There should be one SMS each in the disciplines of Agronomy, Horticulture, Plant Pathology, Entomology, Soil Science and Animal Science. Other four disciplines may be identified as per the need of the district. These disciplines could be Agri-Business Management, Agricultural Extension, Fishery, Agro-forestry, Agricultural Engineering and Home science.	Keeping in view the emerging role of KVKs in the overall development of agriculture, the High Power Committee under the Chairmanship of Dr. R.S. Paroda recommended for increase of four more SMSs from the existing 6 SMSs per KVK with the total sanctioned staff position upto 22 from the current 16 staff in each KVK. These disciplines of SMSs could be Agri-Business Management, Agricultural Extension, Fishery, Agro-forestry, Agricultural Engineering and Home science. The report with recommendation in this regard was submitted for administrative approval at the highest level of authority for consideration and approval.
	b. In many KVKs, certain posts are still vacant. This, to a great extent, is affecting expected performance of the mandated activities of KVKs. The vacant posts need to be filled up on priority and a fixed time frame may be given to the host	After bifurcation of Zone-VI, Guwahati from erstwhile Zone-III, the Zone-VII, Umiam has 43 KVKs with a total 522 staff out of 687 sanctioned staff at present, accounting 75.98% staff are in position. Most of the vacant posts are however with the KVKs under

	institutions for taking up necessary action.	ICAR RC for NEH region, Barapani. Similarly, Zone VI Guwahati has a total 625 staff out of 736 sanctioned posts i.e. 84.91% are in position. However, the concerned host institutes are in the process of recruitment of vacant posts of KVKs under their administrative control.
	c. It is observed that the existing staff strength of Zonal Project Directorate, Zone-III is not adequate to meet the mandated activities effectively and also most of the scientific posts are still lying vacant. The spread of KVK network in the region is quite vast covering 85 districts with poor access. In order to monitor the KVKS effectively it is suggested that North Eastern region be split into two zones	As per recommendation, the erstwhile Zone-III, Umiam has been splitted into two zones namely; Zone-VI, Guwahati covering Assam, Arunachal Pradesh and Sikkim under its jurisdiction and Zone-VII, Umiam covering the remaining other states of the region in order to facilitate effective monitoring, coordination and review of KVKs activities and programmes w.e.f August, 2015.
2. Financial Management	a. ICAR has regularly released funds for conducting the mandated activities of KVK. However, many KVKs are not able to utilize the funds as programme coordinators are not empowered with adequate sanctioning power and imprest amounts; this is particularly seen in KVKs run by state department of Agriculture. It is necessary that programme coordinators may be given adequate powers for effectively implementing the mandated activities.	The matter has been a cause of concern in the financial management of KVKs in discharging their duties and responsibilities and the same has been placed before the higher authority for consideration and subsequent direction to all concerned. As per report of High Power Committee, the financial powers as recommended by the Committee should be delegated to the Head of Krishi Vigyan Kendra, irrespective of host organizations, which should, however, be subject to budget provision.
	b. Most of the KVKs have not been able to develop demonstration units due to lack of adequate funding and infrastructure. Inadequacy of such prerequisites has resulted in poor utilization of allotted revolving funds. A onetime grant of development fund based on the requirement of the KVKs may be considered during 12th plan.	The issue has been submitted to the Council for consideration, approval and sanction. However, in few KVKs demonstration units have been established during 2015-2019.
	c. The infrastructure viz. administrative building, staff quarters, demonstration units and farmers hostels in some of the KVKs have already been	Presently Zone-VII, Umiam has 25 KVKs with administrative building, 25 KVKs with staff quarters, 16 KVKs with farmers' hostels and there are 106

	established and construction work is in progress in many of the KVKs. However, the present pattern of fund allocation is not sufficient to meet the overall expenditure of the proposed activities. The committee is of the opinion that, the actual amount required has to be worked out based on the present cost and provided to KVKs. There should be more number of staff quarters for the staff as per necessity because rented house or dwelling facilities are not available in and around most of the KVKs in this region.	demonstration units. Similarly, Zone-VI, Guwahati has 28 KVKs with administrative building, 6 KVKs with staff quarters, 9 KVKs with farmers' hostels and there are 51 demonstration units and 37 are under construction. The High Power Committee on Management of KVK under the Chairmanship of Dr. R.S. Paroda, in its report recommended for increase number of infrastructure in each KVK including more number of staff quarters, demonstration units, fencing etc. in each KVK.
3. Infrastructure and Connectivity	In Zone-III, most of the KVKs are located in remote areas and as such availability of telephone, power and internet connectivity is a real constraint for effective communication. Providing a generator set and V-SAT facility along with high speed internet for each KVK will help a great deal in improving connectivity and thereby dissemination of Information.	In order to facilitate for effective communication system, this institute has provided solar panel to 2 KVks namely, KVKs-Senapati and Khowai and provision of e-connectivity to 21 KVKs in the zone for improving connectivity and dissemination of information.
4. Technical recommendations	**OFT and FLD**	
	a. Conservation and management of natural resources need utmost consideration in the north east region. Presently, there is a provision for two demonstration units in each KVK farm, which are utilized for hands on practices during training. However, considering the need of the region, more number of demonstration units need to be established. A novel approach would be establishing such units in the progressive farmer's fields to have a real demonstration and participatory extension effect. In this direction, the ZPD should develop a model action plan for the 12th plan period.	There are 106 demonstration units established by KVKs in their instructional farm which are utilized for hand on practice during training in Zone-VII. Moreover, under zone VI, Guwahati 51 demonstration units are established for carrying out similar activities. Besides, IFS have been established in 6 selected KVKs in the zone. KVKs also established farming system based demonstration units under different sponsored special programmes such as NICRA, ARYA, CFLD, NARI etc. Most of the demonstration units are concentrated in adopted villages for doubling farmers' income.

	b. FLD should be strengthened on rain water conservation. Awareness on *"Jalkund"* should be extensively propagated for efficient use of water in lean period to sustain Rabi crops. Similarly, use of farm implements need to be encouraged so as on to reduce drudgery in agricultural operations	KVKs as part of their mandated activities are organizing awareness programme on effective and efficient use of rain water in lean period. During 2018-19, a total of 12 demonstrations were conducted on mechanized paddy harvesting, 2 demonstrations on Jalkund and 10 nos. on power operated paddy thresher, 3 demonstrations were conducted on Low-cost pump, Treadle pump for irrigation of vegetables. Besides, KVKs were successful in organization of 10 nos. Jal Shakti Abhiyan Mela programme in 10 identified blocks of the zone during the current year. With respect to Zone-VI Guwahati, during 2018-19, a total of **5** demonstrations were conducted on mechanized paddy harvesting, **20** demonstrations on Jalkund and **5** nos. on power operated paddy thresher, **5** demonstrations were conducted on Low-cost pump Treadle pump for irrigation of vegetables. Besides, KVKs were successful in organization of **6** nos. Jal Shakti Abhiyan Mela programme in **6** identified blocks of the zone during the current year. Moreover, KVK Longding and KVK Namsai under the zone has tested the farm tools and implements developed by VPKAS, Almora.
	Trainings and Capacity Building	
	a. Citrus, especially Khasi Mandarin is one of the major horticultural crops in the hilly regions of this zone. However, the productivity of the existing plantations of this crop has greatly declined as they are old. A special drive may be made by the concerned KVKs to rejuvenate these old orchards. Training programmes and demonstration need to be enhanced in this regard by securing assistance under	During last 5 years, KVKs under zone-VII taken up various programmes for citrus rejuvenation to ensure production and productivity of citrus cultivation in hilly areas of northeast. Citrus such as Khasi Mandarin, Mandarin oranage, citrus microptera, kachai lime were taken up for their rejuvenation programmes by KVKs. During the period a total of 105.5 ha was covered by KVKs under rejuvenation of citrus and

	National Horticultural Mission and involving the line departments	conducted 89 training programmes and 62 demonstrations which could benefit 295 farmers in the zone. Similarly, During last 2 years, KVKs under Zone-VI taken up various programmes for citrus rejuvenation to ensure production and productivity of citrus cultivation in hilly areas of northeast. Citrus such as Khasi Mandarin, Mandarin orange, were taken up for their rejuvenation programmes by KVKs. During the period a total of 10 ha was covered by KVKs under rejuvenation of citrus and conducted 10 training programmes and 22 demonstrations which could benefit 240 farmers in the zone.
	b. Keeping in view the small size of holdings and consumption pattern: mainly non vegetarian diet there is a vast scope for the development of livestock sector through integrated farming approach. Piggery, Goattery and Dairy are the major sources of earning for marginal farming communities of this region and hence should invariably form the major component of IFS model. A number of integrated farming systems models have been identified by ICAR NEH Complex and its regional stations at different states of the zone. However, due to the socio-economic constraints faced by the farmers, these modules are not adopted by the farmers. KVKs of the zone need to identify and prioritise feasible low cost modules for higher income generation involving these enterprises. The successful modules practiced like piggery and Rabbitery in Phek, Goattery in West Tripura, and Dairy in Kamrup should be further replicated and upscaled.	Farmers in Northeast hilly states are practicing livestock enterprises including poultry, piggery, rabbitery and fisheries as the major components in integrated farming systems for their livelihood and income generation. During 2016-17 to 2018-19, a total of 483 demonstrations were conducted by KVKs in piggery sector with Hampshire Cross, Gungroo, Yorkshire Cross, LWY, Local etc. and distributed 1713 piglets. In Poultry sector, 1581 nos. of demonstrations were conducted by KVKs and distributed a total of 34403 poultry birds among the farmers. During the period, 106 nos. of demonstration were conducted and included in their farming systems. IFS models in few KVKs like Khowai, Zunheboto, Thoubal, Mamit and East Khasi hills have been recently established.
	c. Capacity building of scientific staff of the KVKs in emerging	The ICAR-ATARI, Umiam conducted as many as 60 HRD

	areas such as climate change mitigation, precision farming, and carbon trading and agri business management is necessary. Zonal Project Directorate should arrange for appropriate training programmes at reputed institutions for the KVKs of the region so that a set of master trainers are developed	programmes during last 3 years for KVK personnel under the zone on different frontier areas in collaboration with various national institutions and agricultural universities to upgrade their knowledge and skills in the changing agricultural scenario.
	Innovations & Extension	
	a. Vast areas of NE states especially, Arunachal Pradesh and Sikkim have temperate climate. According to a "rowing committee" constituted by DG, ICAR, in 2012, over 7 lac hectares are suitable for cultivation of temperate fruit crops. Selected KVKs should gear up to take up this activity with an action plan on priority as detailed below	KVK West Kameng is popularizing Low chilling Variety of Apple at farmers fields.
	b. Introduction of elite varieties of temperate fruit crops with pollinizers from CITH, Srinagar (J & K) and Dr. Y.S. Parmar University of Horticulture with proven cultivars and rootstocks for ascertaining the suitability, further selections and multiplications	In collaboration with the ICAR Central Institute of Temperate Horticulture, Sri Nagar, KVK West Kameng has popularized high yielding varieties of Walnut (CITH- W-1) and CITH-W-10, Apricot variety CITH-Apricot- 1 to Apricot-3. And also Apple New Spur type bearing cultivators Red Chief, Silver Spur, Wall Spur, Bright M. Early, Gold Spur were collected from Palampur.
	c. Specialised training courses for SMSs of KVK of 4 districts in Arunachal and 2 districts in Sikkim need to be arranged at Dr. Y.S. Parmar University of Horticulture and Forestry, Solan and CITH, Srinagar. The CIH, Medziphema, Nagaland be equipped to organise training of trainers, Farmers training courses for temperate fruits, initially for Apple, Kiwi and Walnut in temperate districts and low chilling fruits in sub temperate districts in NE. The training courses for farmers of selected districts may be organised by SMS (Hort.) of KVKs of temperate zone districts in consultation with respective state	Specialized training was arranged during 2012, by CIH, Medzephema on Temparate fruits in Jan 2012 for SMSs of Horticulture on Improved Production Technology on Temperate fruit.

	Directorate of Horticulture	
	d. KVKs are located in different altitudes to cater to the technology needs of different agro-climatic zones. It is therefore recommended that technologies developed for a specific agro-climate zone be compiled and adaptive trials be conducted for the same.	Action in this regard has already been taken by this institute after collecting relevant technologies in different disciplines from different ICAR institutes and agricultural universities. The technologies were compiled and published in the form of "Technology Inventory for Northeast India" in 2017 and the same has been supplied to all KVKs in Northeast.
	e. ICT tools should be effectively used for quicker and low cost Transfer of Technology and Information dissemination as well as for the purpose of Intra & Inter institutional communication, reporting, monitoring and coordinating activities of KVKs.	KVKs are adopting different ICT tools as primary means for communication with ICAR-ATARI and other concerned organizations. Online reporting system is effectively used for monitoring and review of most of the activities being implemented by KVKs. Mobile advisory system, internet, e-mail, whatsApp groups etc. are the prominent means of communication.
	Technology backstopping	
	a. The NEH region is endowed with a fragile ecology and prone to soil and water degradation due to shifting cultivation and deforestation in some of the districts. There is a greater need for sustainable management and improvement of soil health through integrated nutrient management practices by utilizing local resources including practices like green manuring, vermicomposting etc. Presently, 25 soil testing laboratories have been established at different KVKs but is not adequate to meet the requirement of all the districts. Soil testing facilities to all the KVKs with required technical support and additional contingency grant may be provided to improve soil test based and balanced application of nutrients	Presently all the functioning KVKs under the zone are provided with soil testing facilities including mini soil testing labs and *Mridaparikshak* for soil testing and recommendation for balanced fertilizers to farmers. During 2016-17 to 2018-19, a total of 57767 samples of soil were tested by KVKs and distributed 74426 Soil Health Cards (SHCs) to 90190 farmers. With respect to Zone-VI, During 2016-17 to 2018-19, a total of 61071 samples of soil were tested by KVKs and distributed 160704 Soil Health Cards (SHCs) to farmers.
	b. The farm mechanization in NEH is low. In order to improve the input use efficiency and minimizing the cost of production, the use of simple tools and	As per recommendation and action plan, KVKs under the zone demonstrated as many as 551 nos. of demonstrations on different improved farm

	implements in different crops needs greater attention. The committee recommends that each KVK should make all out efforts to demonstrate the use of different tools and improved tools in farmers' fields. Provision of laser land leveller, zero till drill and other implements to selected KVKs for better resource conservation may be given priority. There is also need for promoting some NGOs/SHGs to act as Service Providing Centres. Zonal Project Director should explore the feasible modules/protocols for promotion of this concept wherever possible.	implements and equipments such as power operated paddy thresher, paddy harvester, Groundnut Decorticator, Maize Sheller, Grain Cleaner, Solar Dryer, Cono Weeder for weeding, Adjustable Row Marker, Seed Drill etc. during last 3 years. Moreover, KVKs under the zone-VI demonstrated as many as 172 nos. of demonstrations on different improved farm implements and equipments such as power operated paddy thresher, paddy harvester, Groundnut Decorticator, Maize Sheller, Grain Cleaner, Solar Dryer, Cono Weeder for weeding, Adjustable Row Marker, Seed Drill etc. during last 3 years. Moreover, 8 KVKs of the zone have been provided Rs. 32 lakh per KVK for purchasing farm machineries.
	c. NEH Region approximately has 5.63 lakh ha of water bodies that are totally underutilized. In recent years inland fishery has been promoted by the Fisheries departments of different states mostly through production of fish fingerlings which is crucial for integrated farming. Nine identified KVKs have introduced portable carp hatchery for the promotion of fishery sector in the region. A specific work plan for expanding fish fingerlings production should be prepared for the zone based on the resource and manpower availability. Providing sufficient technical and financial support is crucial for the success of their progress.	Fish farming as important component in enhancing farmers' income has been encouraged and promoted among farming community in the region through KVKs. A number of activities and programmes have been taken up by KVKs such as production of fingerlings, composite fish farming and integrated fish farming. As high as 109.16 lakh fingerlings were produced by KVKs during 2016-17 to 2018-19 for the benefit of farmers in the zone. With respect to Zone-VI, as high as 5.06 lakh fingerlings were produced by KVKs during 2016-17 to 2018-19 for the benefit of farmers in the zone.
	Market led extension	
	a. Market led extension is crucial for linking farmers to markets. This enhances sustainable livelihood by complementing their income. Group action approach, through formation of Self Help Groups (SHGs), Commodity groups, Farmers' Interest Groups (FISs), Farmers' cooperatives,	Market led extension as an innovative extension approach is helpful to enhance sustainable livelihood of farmers by complementing their income. Formation of different SHGs, FCGs, FIGs, FPOs etc was done by KVKs in the zone. KVKs namely; Ukhrul, Thoubal, East

	Producers' Companies has to be followed wherever possible.	Khasi Hills, Aizawl, Dimapur, South Garo Hills were successful in formation of FPOs for commodity-wise production and income and employment generation among the farmers. KVKs under Zone-VII conducted as many as 119 training programmes on different aspects of group formation, group dynamics and their effective functioning during 2018-19 for the benefit of 3551 farmers in the zone. Likewise, KVKs under Zone-VI conducted as many as 105 training programmes on different aspects of group formation, group dynamics and their effective functioning during 2018-19 for the benefit of 2830 farmers in the zone.
	b. Northeast should emerge as a horticultural hub. KVKs should facilitate not only production of horticultural produce but also processing and other value addition activities. For this purpose, a value chain approach consisting of forward and backward linkages may be established.	KVKs under Zone-VII are undertaking number of programmes and activities for development of horticulture including value addition and small scale processing by establishing marketing linkages for profitable and remunerative production. During last 3 years KVKs in the zone organized a total of 372 training programmes on value addition of different horticultural produces which could benefit 7494 farmers and farm women, 18 training programmes on small scale processing for 381 beneficiaries and 9 trainings on marketing for 180 beneficiaries. Besides, during last 3 years KVKs in the zone organized a total of 1391 training programmes on value addition of different horticultural produces which could benefit 11094 farmers and farm women, 7 training programmes on small scale processing for 176 beneficiaries and 6 trainings on marketing for 82 beneficiaries.
	c. The Government of India is promoting a "Look East Trade Policy" for promoting trade in North East so that it will serve as a regional hub for capturing the	Considering the importance of export quality of agriculture and horticulture commodities, the Competent authority of the Council has approved and

	business in Myanmar, Bangladesh, and Bhutan. This will throw lots of opportunity for export of agricultural commodities particularly horticulture commodities. There is a need to prepare the farmers to produce quality products for exports. The KVKs need to train selected personnel in this direction so that they can impart the required training to the farmers.	provided fund for implementation of cluster demonstrations on organic farming under PKVY on major agriculture and horticulture crops with 20 ha per KVK. A total of 37 KVKs under the zone VII and 41 KVKs Zone VI have been identified respectively for the purpose. The preliminary actions In this regard including collection of GPS based information through benchmark survey on soil nutrient status, PH, organic matter, major nutrients, soil types of the site of the districts are completed.
	Programmes for tribal population	
	a. The NE region is home of several tribal communities, There is a need to undertake special training programmes so that basic skills in farming is imparted to these communities making use of both the state and central government schemes.	The Zone-VII, Umiam has 27 KVKs out of total of 43 at present under its jurisdiction as TSP districts with over 50% population are tribal. All the activities and programmes meant for KVKs are directly benefitting tribal communities. During 2018-19, out of 32485 total beneficiaries of various training programmes, 29481 were tribal beneficiaries, accounting 90.75%. Whereas, the Zone-VI, Guwahati has 11 KVKs out of total of 45 at present under its jurisdiction as TSP districts with over 50% population are tribal. All the activities and programmes meant for KVKs are directly benefitting tribal communities. During 2018-19, out of 1,83,000 total beneficiaries of various training programmes, 33500 were tribal beneficiaries, accounting 18.31%.
	b. Proper linkages have to be established between NGOs and other developmental agencies for the development of tribal people in this region. Convergence of tribal development schemes is crucial.	KVKs are functioning in convergence with different stakeholders in the zone including line departments, host institutes, NABARD, ATMA, NFDB, PPV&FRA, ICAR institutes, agriculture universities, farmer groups, NGOs etc. for the common cause of improving farmers' livelihood through agricultural development.
	Linkages & collaborations with	

	ICAR/SAUs	
	a. A Special Scientific Advisory Committee is to be constituted for establishing and strengthening the temperate fruit production involving selected KVKs drawing scientists from CITH, Srinagar, Dr. Y.S. Parmar University of Horticulture and Forestry, Solan, CIH, Medziphema, Nagaland and ICAR Complex for NEH Umiam. This committee will provide technical backstopping to a group of KVKs on a continuum basis. The Project Director Zone-III will coordinate the committee meetings and implementation of transfer of technology programmes	In process
	Shifting Cultivation	
	a. The NEH Region is presently having 34,566 Km2 of area under shifting cultivation. There is enormous soil and nutrient loss every year. Now, the Jhuming cycle is also decreased due to the population pressure as well as more need for food and fibre in this region. In these degraded areas, one of the promising opportunities is to grow fruit trees along with the multipurpose tree species (MPTS) by adopting horticulture based agro-forestry system. The committee recommends that need based horticulture based agro-forestry modules be demonstrated by the KVKs in major shifting cultivation areas. Also, a special funding be provided for this purpose	In addition to horticulture and allied sectors, KVKs under the zone are taking up different need based horticulture based agro-forestry modules for demonstrations in their respective districts specially by KVKs having SMS in Agro-forestry. This included activities like plantation of multipurpose tree species (MPTS) by adopting horticulture based agro-forestry system.
	b. Jhoomia farmers or shift cultivating farmers should be encouraged to take up Horti-silvi-pastoral farming systems.	KVKs are encouraging farmers for adoption of different suitable horti-silvi-pastoral farming system particularly in areas where shifting cultivation practices are continuing. Different training programmes were also conducted on different horticulture based farming systems as alternatives to shifting cultivation. During 2017-19, 194 training programmes on improved technologies of fruit crops benefitting 5186 farmers were

		conducted by KVKs. While 30 trainings for 782 farmers on ornamental crops and 53 trainings were conducted for 1429 farmers on plantation crops during the period. With respect to Zone-VI during 2017-19, 182 training programmes on improved technologies of fruit crops benefitting 4870 farmers were conducted by KVKs. While 28 trainings for 450 farmers on ornamental crops and 66 trainings were conducted for 1020 farmers on plantation crops during the period.
5. Policy Recommendations	The North Eastern hill region is presently having 85 rural districts in eight states with a total geographical area of 2, 62,230 Km2. Most of the villages in these districts are very poorly connected and hence, accessibility to these villages is extremely poor. In this region, some of the districts are also having geographical area to the extent of 2,448 Km2 (Ri-Bhoi). To undertake extension programmes in more and more number of villages, the concept "Satellite KVKs" be tried on the line of two KVKs, in the larger districts of the country. These satellite KVKs be tried on a pilot basis in ten (10) districts	The decision in this regard has already been communicated to the concerned KVKs and host institutes for effective functioning of KVKs by sharing specialized manpower and infrastructure of the nearby KVKs. This will enhance in exchanging ideas and experiences besides establishing enabling and functional linkages among the KVKs. During last three years 15 new districts have been created in Manipur, Meghalaya and Mizoram.
6. General Recommendations	**Enhancing the reach and access of KVKs**	
	a. Presently, a Jeep has been provided to each KVK for mobility of the scientific staff to conduct off campus demonstrations and training programmes. In most of the occasions, KVK staff is unable to reach the distant places of the district due to extreme remoteness (where four wheelers cannot move), and high wear and tear expenditure. Considering the need for higher mobility and access to the remote areas, providing two motorbikes (two wheelers) to each of the KVK is	The proposal in this regard has been placed for consideration before the competent authority of the Council for increased facility of mobility of KVK staff and the approval and decision of the same is awaited from the Council.

	recommended.	
	Conduct of Scientific Advisory Committee meeting of KVKs	
	It has been observed that most of the KVKs are not conducting the Scientific Advisory Committee (SAC) meetings regularly. Many of them have not conducted even a single meeting in a year. The Committee recommended that all the KVKs should conduct two SAC meetings regularly and the Zonal Project Directorate should strictly monitor the conduct of this meeting with their active participation.	With strong direction and interventions by the ICAR-ATARI, Zone-VII, all functioning KVKs under the zone are now conducting Scientific Advisory Committee (SAC) meetings regularly to review KVKs activities and formulation of meaningful action plan. During 2018-19, all the functioning 40 KVKs conducted SAC meetings in the zone. Likewise, all the functioning **42** KVKs conducted SAC meetings in the zone VI Guwahati during 2018-19.

Research Projects

In-house research projects

- Impact analysis of KVK activities in North east India
- Prioritization of Northeast Indian districts in terms of vulnerability to extreme climatic events and devising suitable adaptation and mitigation crop management strategies
- Farmers' perception towards climate changes and their resilient strategies in agriculture
- Job Performance of subject Matter Specialists (SMSs) of *Krishi Vigyan Kendras*: A Case of North eastern Region of India.
- Cropping intensification and diversification for production enhancement in North East Region
- Information need of farmers of NE Region for adoption of Agricultural Technologies

Externally funded research projects

- Biotechnology led organic farming in the NE region: Technology assessment, refinement and demonstration for high value crops (completed)
- National initiative on climate resilient agriculture (on-going)
- Attracting and Retaining of Youth in Agriculture (ARYA) (on-going)
- Farmer FIRST Programme (FFP) (on-going)
- Cluster FLDs under National Mission on Oilseed and Oil Palm (NMOOP) and National Food Security Mission (NFSM) (on-going)
- New Extension Methodologies and Approaches (NEMA) (on-going)

Special Programmes

- Demonstration on growth performance of improved fish varieties (Jayanti, Rohu and Amur Carp)
- Creation of Seed Hubs for increasing indigenous production of Pulses in India
- *Krishi Kalyan Abhiyan* (KKA I & II)
- Skill Training of Rural Youth

Outreach Programmes

- Doubling Farmers' Income
- *Pradhan Mantri Fasal Beema Yojana* Programme
- *Jal Shakti Abhiyan*
- *Mera Gaon Mera Gaurav* (MGMG)
- *Pradhan Mantri Kisan Samman Nidhi* (PM-KISAN)
- *Pradhan Mantri Kisan Maan-Dhan Yojana* (PM-KMY)
- PKVY *(Paramparagat KrishiVikasYojana)*- Organic farming
- National Animal Disease Management

Salient findings of projects

Farmers' perception towards climate changes and their resilient strategies in agriculture

Socio-personal characteristics of respondents

- Majority of respondents (75.92%) belonged to the middle age group (21-55 years)
- Near about three fourth (74.83%) of the respondents were male.
- Majority (69.58%) of the respondents belonged to the Scheduled Tribe category
- Majority (66.95%) of the respondents had a family size up to 5-10 members
- More than one third (35.64%) of respondents completed matriculation
- The average annual income of most of the respondents (66.96%) were less than one lakh

Awareness about climate change and its effects

- More than 38 per cent of respondents perceived the negative effects of climate change frequently.
- About 35 percent of the respondents perceived that the monsoon cycle is gradually changing, affecting availability of water for crop farming.

Farmer-led mitigation measures adopted

- Majority (55%) of the farmers adopted / brought changes/ modified their existing farming practices, 19% changed cropping pattern, 9% went for diversification, 12% followed different moisture conservation techniques.

Impact Analysis of KVK activities in North East Region

Impact on knowledge

The highest impact of 34.05% due to KVK activities on gain in knowledge of technology adoption by farmers in different crops and livestock enterprises was found among the farmers of adopted villages over the farmers of non-adopted villages in rice technology. This was followed by vegetables cultivation (32.85%), dairy farming practices (31.35%), fisheries (29.17%), poultry (28.85%) and piggery (25.38%) respectively.

Impact on Skill development

The study also reveals that farmers in adopted villages had maximum level of skills development in adoption of fisheries practices as evident by its highest impact level of 22.78% gain over the farmers of non-adopted villages with the technical guidance and

assistance from the concerned KVK in the districts compared to other enterprises. This was followed by dairy (15.40%), piggery (13.30%), rice (10.93%), vegetable (9.91%) and poultry (8.02%) respectively.

Impact on attitude of farmers

In regard to attitude of farmers, the study showed the most favorable attitude of farmers attitude towards front line demonstrations (FLDs) undertaken by the KVKs with 51.55% gains in attitude by the farmers of adopted villages over the farmers of non-adopted villages. The other activities in order of importance of gain in favourable attitudes by the beneficiary farmers were on-farm testing (OFTs) with 46.39% gains, followed by different training programmes (44.21%), extension activities (36.75%) and production of quality seeds and planting materials (30.64%) respectively.

Socio-economic impact of KVK activities

The study reveals that the most significant impact on knowledge of technology application due to KVKs activities was observed in rice cultivation. While skills development in fisheries sector was seen with highest level of impact compared to other enterprises. So far attitude of the farmers towards different mandated activities of KVKs was concerned, the frontline demonstration (FLD) was reported as the most favourable attitude with highest level of effectiveness and credibility on the part of the farmers. The project results also indicate the highest impact on socio-economic parameter namely; increase in cropping intensity followed enhancing employment generation and increase in crops and livestock yields among the farmers due to KVK activities. Hence, strategy should be chalked out for intensive and extensive KVKs extension programmes including location and farming systems specific technology demonstrations to improve other parameters of socio-economic development among the farmers in the region.

Job Performance of subject Matter Specialists (SMSs) of *Krishi Vigyan Kendras*: A Case of North eastern Region of India

Socio-personal characteristics of respondent SMSs

- Out of a total number of 231 respondents under study, 86 (37.23%) belonged to Schedule Tribe; 11 (4.76%) belonged to schedule Cast; 42 (18.18%) belonged to Other Backward Classes and remaining 92 (39.83%) belonged to the General category.
- The proportion of women SMSs was found to be quite high -99 in numbers *i.e.* (42.86%) out of total of 231 SMSs under study.
- The mean age of respondents was 36.4 years (range: 31.00 – 42.1 Years)
- Majority of respondents (76.16) were Post graduate

Job Performance of SMSs

- As per the composite job performance index (CJPI), the performance of near about half (47.61%) of the total number of SMSs was found to be low to very low; 34.20 % fall in medium performer category and remaining only 18.18% of the SMSs were in High performance category.
- according to the rating given by the superiors (PCs), (38.52%) of the total number of SMSs was found to be low to very low; 37.66 % fall in medium performer category and remaining only 23.81% of the SMSs were in High performance category.

Factors of Job performance

A principal component analysis with varimax rotation clubbed 38 variables into 9 performance determining factors; those were- F-I: Organizational climate; F-II: Adequacy of technology application and dissemination aids; F-III: Physical Infrastructure; F-IV: Communication facilities; F-V: Road and transport; F-VI: Professional mentoring; F-VII: Farm for experimentation and demonstration; F-VIII: Freedom from damage; F-IX: Job stress and remuneration.

National Innovations on Climate Resilient Agriculture (NICRA)

National Innovations on Climate Resilient Agriculture (NICRA) is a network project of the Indian Council of Agricultural Research (ICAR) launched in February, 2011. The project aims to enhance resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. The project was formally launched by the Hon'ble Union Minister for Agriculture & Food Processing Industries Shri. Sharad Pawarji on 2nd of February, 2011.

During the year 2011 to 2015, there were 17 numbers of KVKs representing different agro-climatic conditions with designated problem areas were distributed in 8 North East States and in the year 2015-16, six new NICRA KVKs were included in the six districts of North East. viz., KVK, Karbi Anglong in Assam, KVK, Ukhrul in Manipur, KVK, Jaintia Hills in Meghalaya, KVK, Serchhip in Mizoram, KVK, Mon in Nagaland and KVK, Dhalai in Tripura and altogether a total numbers of 23 KVKs were under NICRA Project. The list of 14 NICRA KVKs under ICAR-ATARI, Zone-VII along with adopted villages and climatic vulnerabilities is listed below:

Table: State wise details of operational NICRA KVKs along with adopted village(s) and their climatic vulnerability

State	KVK	Vulnerability	Status
Arunachal Pradesh	West Siang	Drought/water stress	On-Going
	West Kameng	Cold Stress	Completed
	Tirap	Drought/water stress	On-Going
Assam	Cachar	Flood	On-Going
	Dhubri		On-Going
	Dibrugarh		On-Going
	Sonitpur		On-Going
	Karbi-Anglong	Moisture stress	On-Going
Manipur	Imphal East	Drought/water stress	On-Going
	Senapati	Drought/water stress	On-Going
	Ukhrul	Frost /Soil Erosion	On-Going
Meghalaya	Ri Bhoi	Drought / water stress Frost / Hailstorm	On-Going
	West Garo Hills	Drought/water stress	On-Going
	Jaintia Hills	Drought/ Flood	On-Going
Mizoram	Lunglei	Water stress	On-Going
	Serchhip	Drought	On-Going
Nagaland	Dimapur	Drought/water stress	On-Going
	Mokokchung		On-Going
	Mon		On-Going
	Phek		On-Going
Sikkim	East Sikkim	Soil Erosion & Water stress	On-Going
Tripura	Dhalai	Flood/ Soil erosion	On-Going
	Khowai (West Tripura)	Drought like situation	On-Going

Monitoring of piggery unit in one of the adopted villages

In-situ soil moisture conservation through mulching using paddy straw

During 2017-18, ATARI was divided into two zones in the Northeast *viz.,* ICAR-ATARI, Zone-VI, Assam (comprising of the states of Arunachal Pradesh, Assam and Sikkim) and ICAR-ATARI, Zone-VII, Umaim, Meghalaya (comprising of the states of Manipur, Meghalaya, Mizoram, Nagaland and Tripura) and the number of NICRA KVKs was reduced to 14 from 5 states.

For enhancing resilience of Indian agriculture to climate change and climate vulnerability, it was proposed to tackle the problem head on through six different modules which are as follows:-

Module I: Natural Resource Management

Natural Resource Management module has been categorized into three sub modules, *viz.,* i.) In-situ moisture conservation measures, ii.) Ex-situ moisture conservation measures and iii.) Soil health improvement interventions. In-situ moisture conservation measures covers all possible interventions for conservation of moisture such as mulching, modified land preparation like raised and sunken bed method of raising crops, *etc.,* conservation tillage and others so that soil moisture is conserved in-situ. Ex-situ methods of water conservation include construction of farm ponds, Jalkunds, check dams to control run-off and other such structures. Soil health measures consists of interventions to check and maintain the soil health and these interventions are distribution of soil health cards so as to check the soil property periodically, adoption of green manuring, composting using farm and kitchen waste such as vermicomposting *etc.,* and other such interventions.

Cultivation of improved paddy var. Bhalum-3

Module II: Crop Production

Under Crop production module, interventions such as introduction of improved crop varieties which could withstand drought/flood/temperature tolerance, high yielding varieties, short and medium duration varieties of crops, advancement of planting dates of rabi crops in areas with terminal heat stress, water saving paddy cultivation methods (SRI aerobic direct seeding), location specific intercropping systems with high sustainable yield index, protected cultivation, conservation tillage wherever applicable, crop diversification, integrated crop management, pest and disease management, apiary for aiding in fertilization process, mushroom cultivation, integrated farming system and other interventions which are climate resilient which could be beneficial for the farmers in every way.

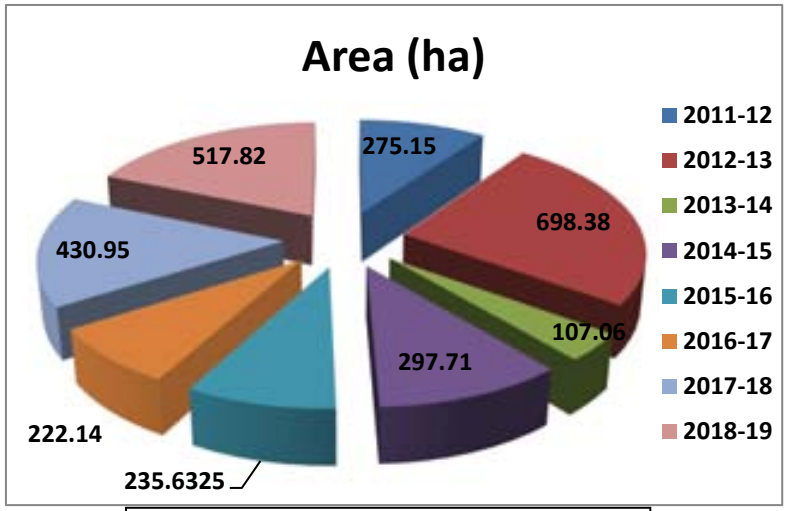
Module III: Livestock & Fisheries interventions

For improving the conditions of livestock and fisheries against climate change, several interventions were introduced in the adopted villages with the objective of helping the farmers to attain better output from their farms. These interventions include the introduction of improved fodder/feed for livestock and storage of feed, scientific/improved shelters so as to escape any kind of temperature stress and climatic abnormalities, preventive vaccination, de-worming, animal health check-up, management of fish ponds / tanks during water scarcity and excess water, introduction of improved breeds of livestock, feeding management for better performance and so on.

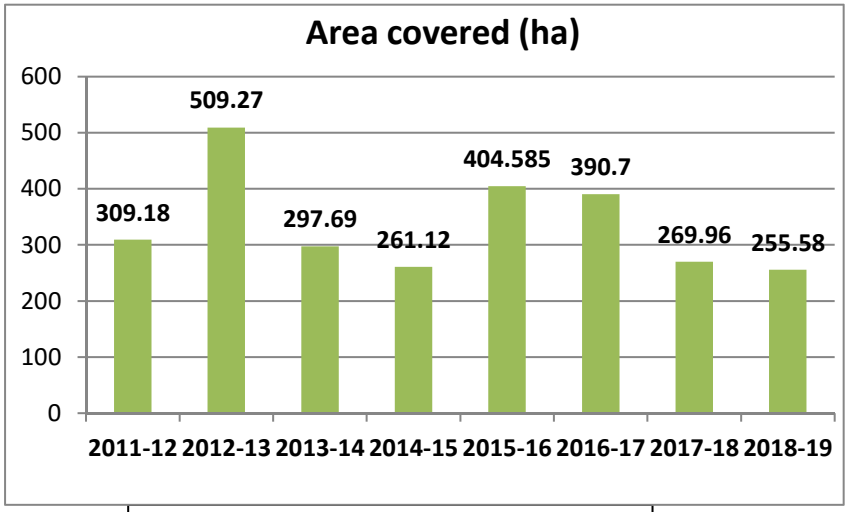
Module IV: Institutional Interventions

These are the interventions that could better equip the farmers against unusual climatic aberrations. Interventions such as establishment of seed bank, fodder bank, commodity groups, community nurseries during floods and droughts, custom hiring centers and climate literacy through a village level weather station have proven to be highly beneficial to the farmers in the adopted villages.

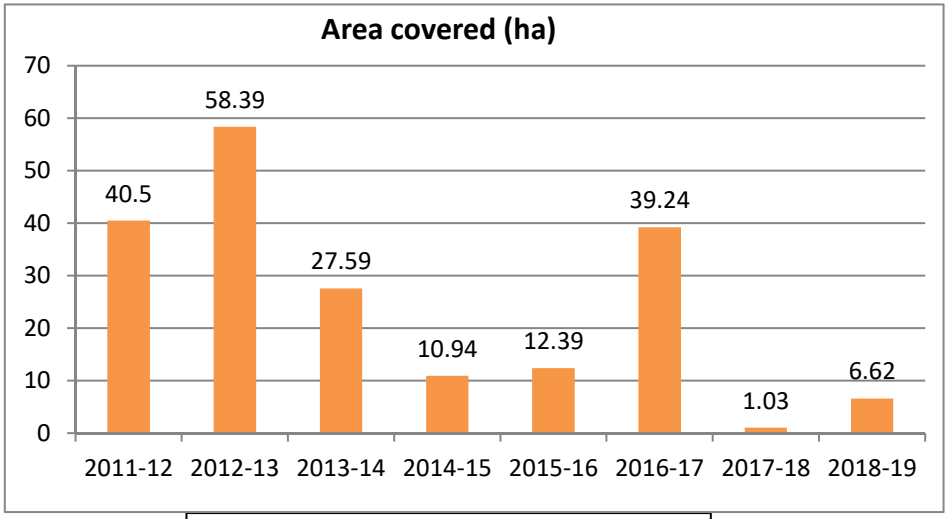
Figure B. Area covered under each module since inception of the project



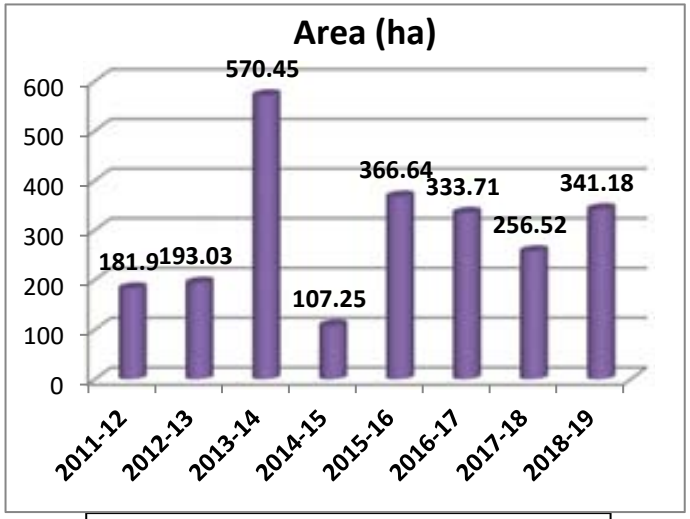
A. Natural resource management



B. Crop production



C. Livestock & fisheries interventions



D. Institutional interventions

Capacity Building

Capacity building activities are incorporated in the project to enable the farmers to get a better understanding about the consequences of climate change and how to combat it. Courses on proper utilization of natural resources, resource conservation techniques, use of farm implements and machineries, crop management, crop production, seed production, nursery management, composting and promoting zero burning, pest and diseases management, fish farming, integrated farming systems, soil health management, post-harvest technology and value addition to minimize wastage, livestock management through scientific housing and feed management, backyard poultry farming, piggery farming, income generation activities through mushroom cultivation, apiary and others, protected cultivation of crops in areas with unpredictable weather conditions, weed management, group dynamics and other such courses are important to better equip the farmers with proper knowledge about climate change.

ARYA (Attracting and Retaining Youth in Agriculture) Project

"Attracting and Retaining Youth in Agriculture (ARYA)" was implemented in 2015-16 in 25 KVK districts in the country with a budget provision of Rs. 100 crores. The project has been under implementation in 3 KVKs *viz*. Wokha (Nagaland), Lunglei (Mizoram) and Senapati (Manipur) under ICAR-ATARI, Umiam. Accordingly, 3 more KVKs under the zone were approved for implementing the project in 2018-19 which includes Jaintia Hills (Meghalaya), Tuensang (Nagaland) and Dhalai (Tripura).

Achievements of ARYA project

In the year 2016-17, KVKs of Karbi Anglong, Senapati, Lunglei, Wokha and North Sikkim took up various enterprises which included poultry, piggery, fishery, pineapple cultivation, mushroom cultivation, large cardamom, bee keeping, cut flowers and off season vegetables production under walk in tunnel. There were a total number of 586 rural youth who were benefited from these enterprises. Skill based techniques were imparted to the youth through training and demonstration on all the enterprises. Market linkage was also developed with the state marketing board and private groups. During 2017-19, a total of 32 nos. of training programmes were conducted on different enterprises under the project by the 3 ARYA KVKs benefitting a total of 1277 rural youth and 86 demonstrations youth for beneficiaries.

Impact of ARYA project

At least 200 numbers of skilled youth were developed through this project. The livelihood security of the family of farm youth was promoted and an increased knowledge and skills

on various enterprises of agriculture and allied sectors was achieved. Also there was increase in awareness among the villagers and youth on the importance of agriculture and allied sectors in food, nutritional and livelihood securities which helped to reduce migration due to generation of direct and in direct employment in rural areas.

Table: Achievement of ARYA project during 2017-19

Name of KVK	Name of enterprise /Component	No of unit	Training		Demonstration (No.)	
			No. of training	No. of Participants	No. of demonstration	No. of Participants
Senapati Manipur	Mushroom cultivation	36	2	60	9	**50**
	Piggery	18	2	60	6	**43**
	Poultry	71	2	60	8	**41**
	Fishery	13	2	60	8	**47**
	Large Cardamom	10	1	34	4	**45**
Lunglei Mizoram	Piggery	7	14	322	7	**35**
	Poultry	6	12	297	7	**35**
	Mushroom	4	12	270	4	**20**
	Bee Keeping	4	11	235	4	**20**
Wokha Nagaland	Mushroom	9	5	103	14	**30**
	Poultry	7	1	20	10	**24**
	Piggery	15	1	20	16	**22**
	Floriculture-cut flowers	2	1	10	3	**10**
	Total	**202**	**54**	**1277**	**86**	**351**

Farmer First Programme (FFP)

The Farmer FIRST project is one of the most important projects launched by ICAR during 2016-17 with an aim to involve farmers for technology development/refinement based on their needs utilizing their own Farm Innovations and Resources incorporating the latest development in Science and Technology (FIRST).

Operational Area and Participating Institutions

ICAR Institutes and AUs may take part in implementation of the project at field level. One institute will adopt about 500-1000 farm families spread over in near- by cluster of 2-4 villages. The farmers will be the major target groups with emphases on small and marginal farmers and farm women. The four ICAR institutes like NAARM, NIAP, IASRI and DKMA will provide support to the project in development of processes and methodologies, content development, database creation and regular assessment and impact evaluation.

Achievements of the Farmers FIRST Project

Module	Area covered (ha)/ units (no)			No. of Farm families covered (no)		
	2016-17	**2017-18**	**2018-19**	**2016-17**	**2017-18**	**2018-19**
Crop	43.5	84	64	207	542	478
Horticulture	79	327		9	327	
Livestock	3000 nos and 95 ha	3000 nos and 2.5 ha	3000 nos and 2 ha	504	377	272
Enterprise		12	34 nos		180	11
NRM		10	7 nos			9
IFS & Fish		10	32500			

Impact of Farmer First Programme (FFP)

The project involved the farmers in research problem identification, prioritization and conducted experiments in farmers' field utilizing the resources available with them. It integrated both 'enriching knowledge' and 'technology' to qualify the meaning of Farmer FIRST in Indian context. The modules designed helped to enrich the knowledge of research systems as well as farmers to learn from each other in context to existing farm environment, perception of each other and interactions with the sub-systems established around. Over all enhancement of the farmer-scientist interface for technology development and application was possible through this project. The emphasis on focus to innovations, technology, feedback, multiple stakeholder's participation, multiple realities, multi method approaches, and vulnerability and livelihood interventions was achieved.

Cluster Frontline Demonstration on Pulses and Oilseeds under NFSM and NMOOP

Year of implementation: 2015

GOI is striving to increase the oilseed and pulses production. In the same direction the ICAR has taken an initiative to augment oilseed and pulses production and productivity in the country. ICR has activated a collaborative project Cluster Frontline Demonstration on Oilseeds and Pulses under NFSM and NMOOP with financial assistance of Department of Agriculture, Cooperation and famers welfare, GOIM, New Delhi . Under CFLD, the KVKs plays a key role in conducting demonstrations with proven technological packages resulting in production of sufficient quantity of oilseeds to meet per capita availability of oilseeds for ensuring nutritional security. KVKs conducted Cluster frontline demonstration (FLDs) to demonstrate the production potential of newly released technologies on the farmer's fields at different location in a given farming system and organized farming and extension activities for farmer and extension workers for dissemination of various technologies.

Total area covered and total number of demonstration covered under CFLD

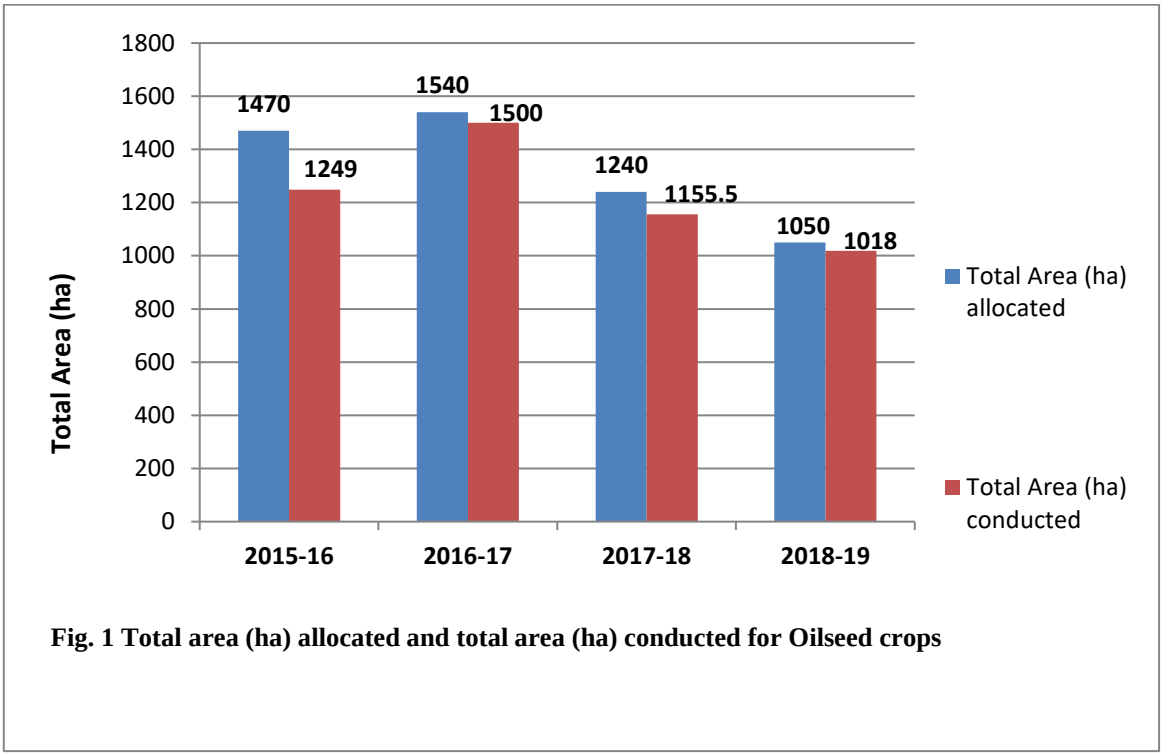


Fig. 1 Total area (ha) allocated and total area (ha) conducted for Oilseed crops

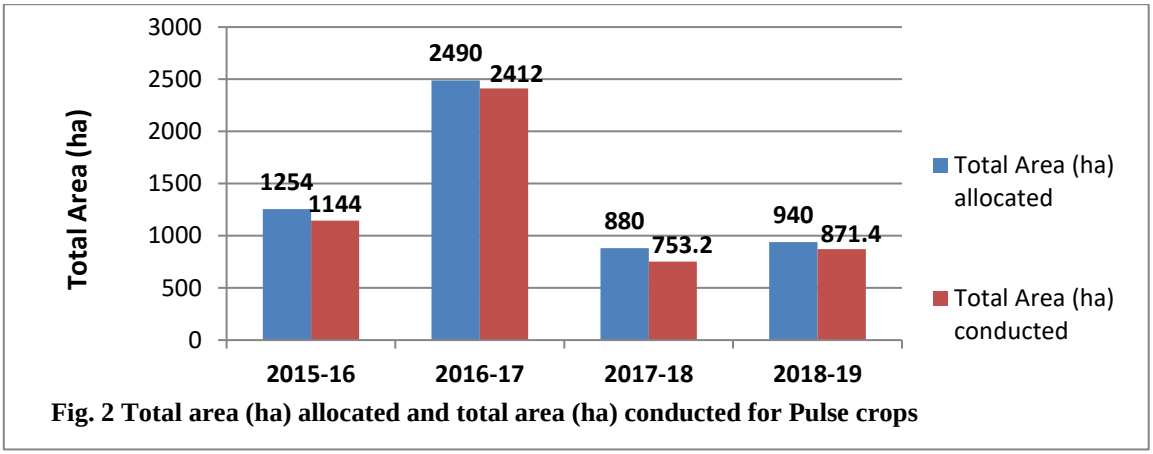


Fig. 2 Total area (ha) allocated and total area (ha) conducted for Pulse crops

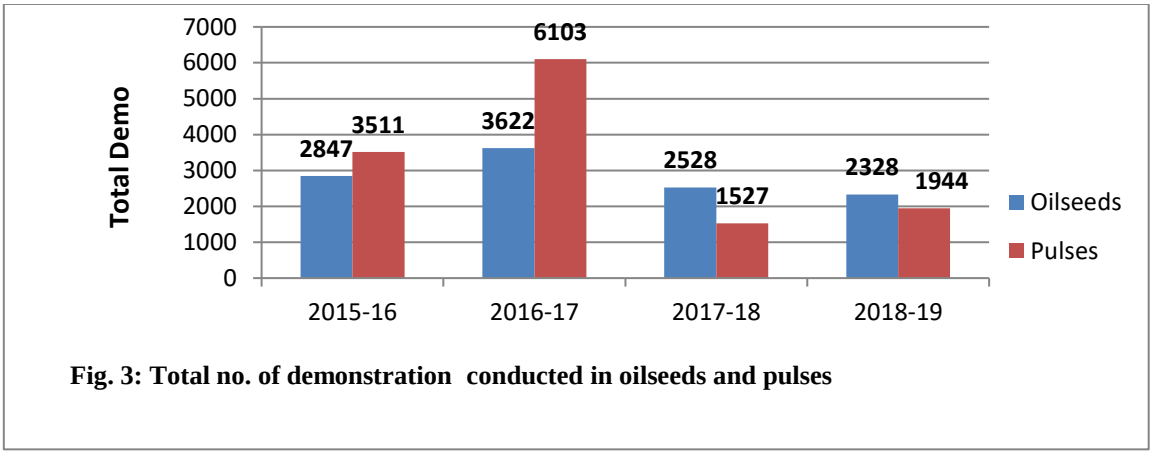


Fig. 3: Total no. of demonstration conducted in oilseeds and pulses

Achievements of CFLD

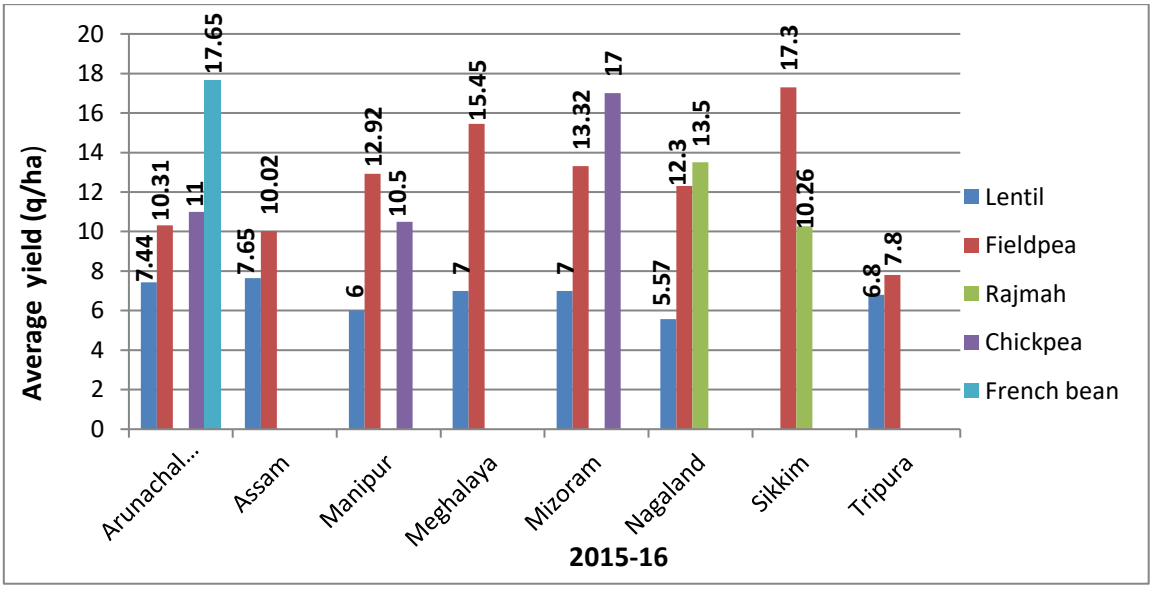


Fig. 4: State-wise details of productivity of Pulses Crops under NMOOP during 2015-16

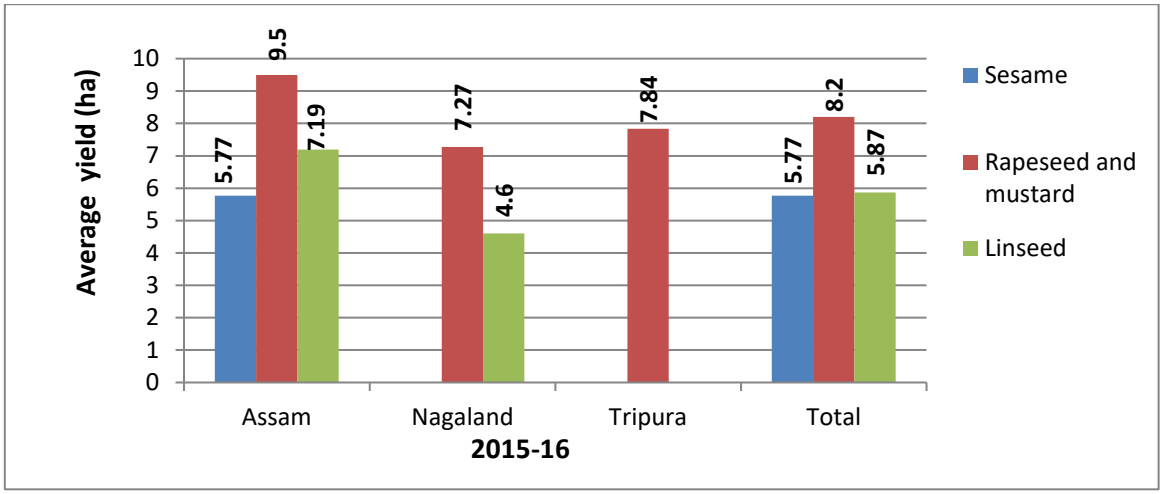


Fig. 5: State-wise details of productivity of Oilseeds Crops under NMOOP during 2015-16

During **2015-16**, a new initiative of Cluster FLD on oilseeds and pulses was taken up by the selected KVKs under National Mission on Oilseed and Oil Palm (NMOOP) and National Food Security Mission (NFSM). A total of 1470 hectare of area was allocated for cluster FLD on oilseeds, of which 1249 hectare area was covered for the purpose for 2847 nos. of demonstrations (**Fig. 1**). The cluster demonstration on oilseeds included rapeseeds and mustard (var. TS-36, TS-38, TS-46, TS-67, JT-90-1) and linseeds (var.T-397, Padmini, NL 165 and Ruchi). The average productivity among the oilseed crops was found to be the highest in rapeseed and mustard in the state of Assam with a production rate of 9.5 q/ha **(Fig. 5**). While a total of 1144 hectare area were covered for cluster demonstration on pulse crops, out of allocated area of 1254 hectares. Thus a total of 3511 nos. of demonstrations on pulses were conducted by the selected KVKs in the region. These included Pea (var. Prakash, HUP-2, Rachna, Anupam), black gram (var. IPU-94-1, Tripura Maskolai), Chick pea (var. AP- 1, V), Rajmah (var. Jwala, Anupam). The average productivity among the pulse crops was found to be the highest in French bean in the state of Arunachal Pradesh with production rate of 17.65 q/ha (**Fig. 4**).

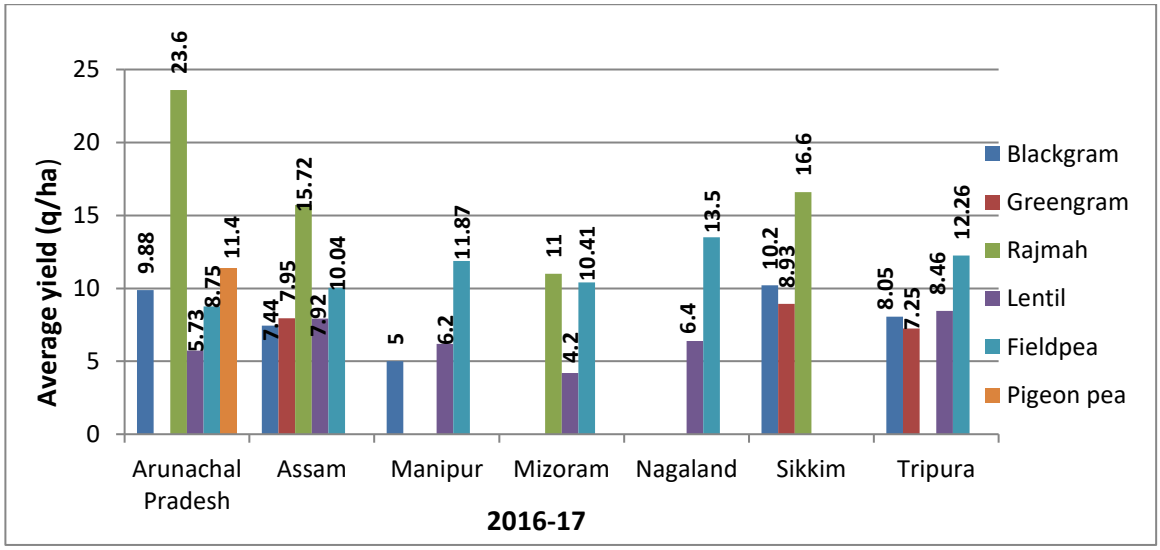


Fig. 6: State-wise details of productivity of Pulses Crops under NMOOP during 2016-17

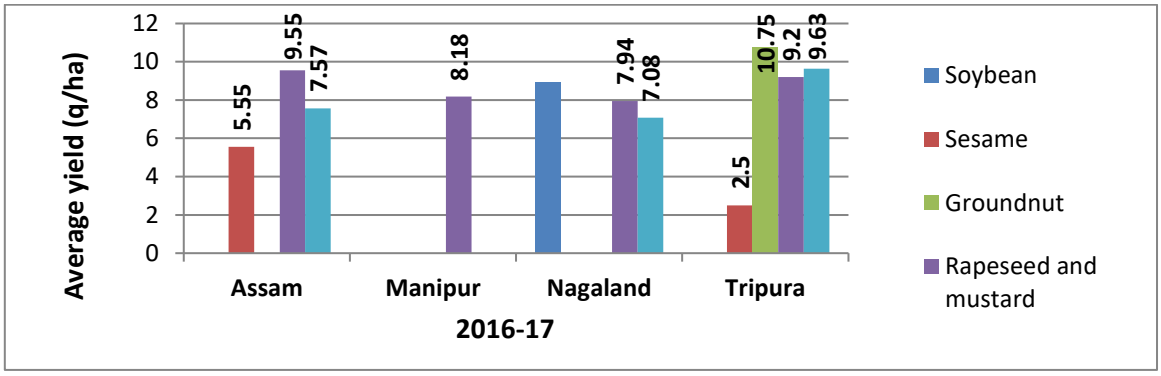


Fig. 7: State-wise details of productivity of Oilseed Crops under NMOOP during 2016-17

During **2016-17**, the Cluster FLD on oilseeds and pulses was taken up by the 53 selected KVKs under National Mission on Oilseed and Oil Palm (NMOOP) and National Food Security Mission (NFSM). A total of 1540 hectare of area was allocated for cluster FLD on oilseeds, of which 1500 hectare area was covered (**Fig.1**) for the purpose with 3622 nos. of demonstrations (**Fig .3**). The cluster demonstration on oilseeds included rapeseeds and mustard (var. TS-36, TS-38, TS-46, TS-67, JT- 90-1) and linseeds (var. T-397, Padmini, NL 165 and Ruchi). The average productivity among the oilseed crops was found to be the highest in Groundnut conducted in the state of Arunachal Pradesh with a production rate of 10.75 q/ha (**Fig.7**).

While a total of 2412 hectare area were covered for cluster demonstration on pulse crops out of the allocated area of 2490 hectares (**Fig. 2**). Thus, a total of 6103 nos. of demonstrations on pulses were conducted by the selected KVKs in the region (**Fig.3**). These included Pea (var. Prakash, HUP-2, Rachna, Anupam), Lentil (Hul-57, Maitree), Blackgram (var. IPU-94-1, Tripura Maskolai), Greengram (Pratap) and Rajmah (var.

Jwala, Anupam). The average productivity among the pulse crops was found to be the highest in Rajmah conducted in the state of Arunachal Pradesh with a production rate of 23.6 q/ha (**Fig.6**).

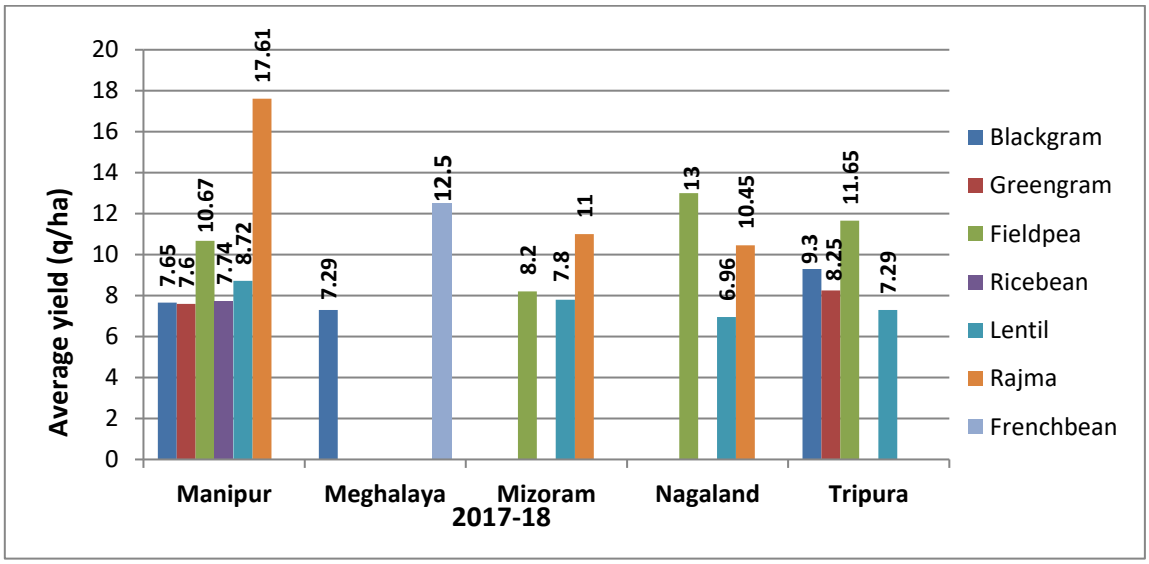


Fig. 8: State-wise details of productivity of Pulse Crops under NMOOP during 2017-18

During the year **2017-18**, a total of 4055 nos. of Cluster Frontline Demonstrations were conducted on Oilseeds and Pulses in 5 North-eastern States of Manipur, Meghalaya, Nagaland, Mizoram and Tripura covering 1908.7 hectares. The total area covered by Pulses (Kharif & Rabi Season 2017-18) was 753.2 ha out of the allocated 880 ha (**Fig. 2**) with 1527 no. of demonstrations (**Fig. 3**). In Oilseeds, total area covered (Kharif & Rabi Season 2017-18) was 1155.5 ha out of the allocated 1240 ha (**Fig.1**) with 2528 no. of demonstrations (**Fig. 3**).

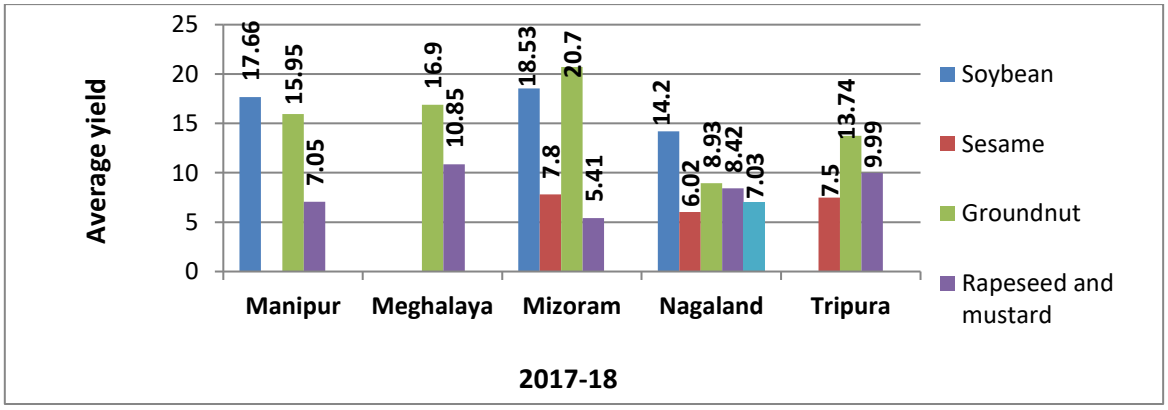


Fig. 9 : State-wise details of productivity of Oilseed Crops under NMOOP during 2017-18

Cluster Frontline Demonstration was conducted in different Pulses crops like Blackgram (PU-31, Tripura Maskolai, PU- 31), Green gram (IPM-2-3, Pusa Vishal, Tripura Mung 1),

Rice Bean (var. local), Rajma (Local, Utkarsh, HUR-301), Lentil (var. HUL-57), Field Pea (var. Prakash) and French Bean (var. Anupam). The average productivity among the pulse crops was found to be the highest in Rajmah conducted in the state of Manipur with a production rate of 17.61 q/ha (**Fig.8**). In Oilseed crops, Cluster Frontline Demonstration was conducted in Soybean (var. JS-335, JS-9560), Sesamum (ST-1683, Chhibung, Tripura Siphing), Groundnut (K- 6, ICGS-76, TG-38), Rapeseed & Mustard (TS-36, TS-38, TS-67) and Linseed (Sharda, RLC-92, Ruchi). The average productivity among the oilseeds was found to be the highest in Groundnut conducted in the state of Mizoram with a production rate of 20.7 q/ha (**Fig.9**).

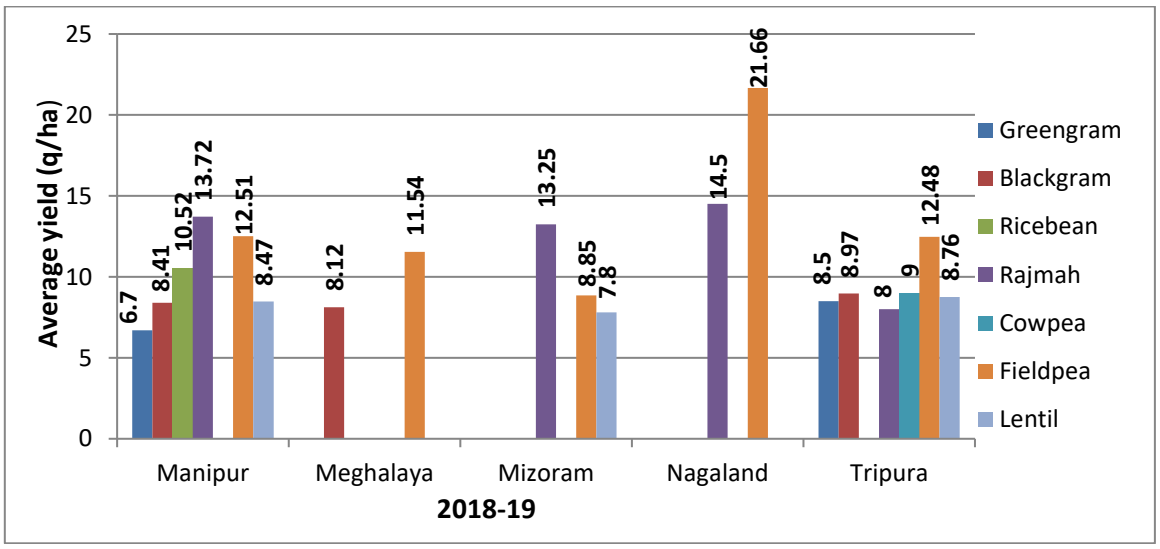


Fig. 10: State-wise details of productivity of Pulse Crops under NMOOP during 2018-19

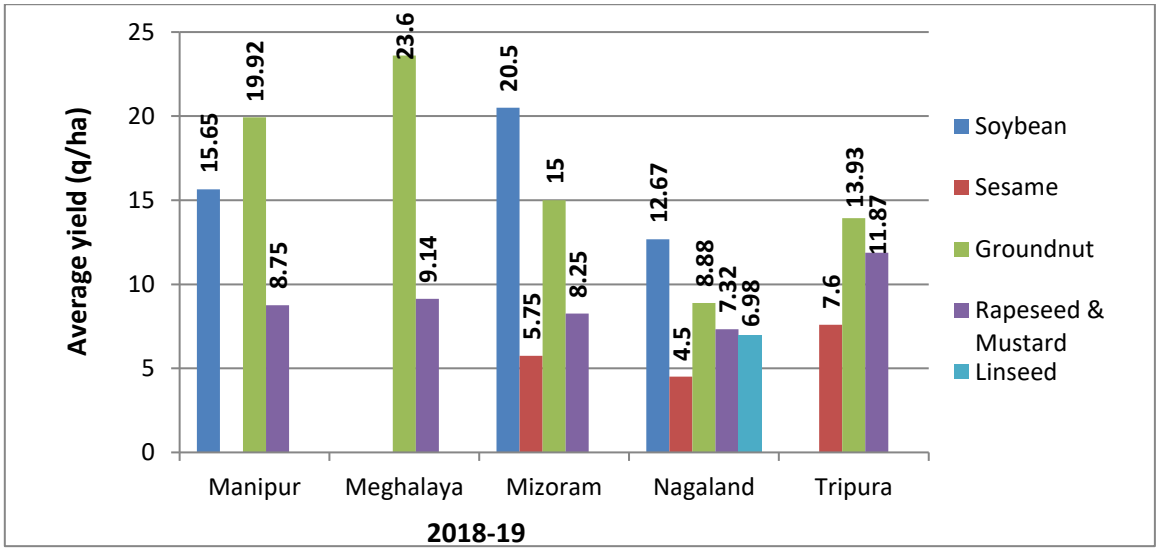


Fig. 11: State-wise details of productivity of Oilseed Crops under NMOOP during 2018-19

During the year **2018-19**, a total of 4272 nos. of Cluster Frontline Demonstrations on oilseeds and pulses were conducted in 5 North-eastern States of Manipur, Meghalaya, Nagaland, Mizoram and Tripura covering total area of 1889.4 ha . The total area covered by Pulses (Kharif & Rabi Season 2018-19) was 871.4 ha out of 940 ha allocated (**Fig. 2**) with 1944 no. of demonstrations (**Fig. 3**). In Oilseeds, total area covered (Kharif & Rabi Season 2018-19) was 1018 ha out of 1050 ha allocated (**Fig. 1**) with 2328 no. of demonstration (**Fig 3).** Cluster Frontline Demonstration was conducted in different Pulses crops like Blackgram (var. PU-31,Tripura maskolai, Kalindi),Green gram (var. Tripura mung -1, IPM-2-3), Field pea (var. Aman,Rachma,Prakash) ,Lentil (var. HUL-57, WBL-77) and Rajma (Canadian Red, Utkarsh, Kholar) Rice bean (var. Local) Cowpea (var .Kashikanchan). The average productivity among the pulses was found to be the highest in Fieldpea conducted in the state of Nagaland with a production rate of 21.66 q/ha (**Fig.10**).

In case of Oilseed crops, Cluster Frontline Demonstration was conducted in Soybean (var. DSb 19, JS-97-52, JS-335, JS-9305, RVS 2001-04, JS 95-60) ,Sesame (var. Chhibung , ST-1683,Tripura Siphing), Groundnut (var. ICGS-76, GPBD-4, ICGS-75,G-2, TG-38, TAG 28),Rapeseed & Mustard (var.NRCHB-101, TS-36 ,TS-38, TS-67,TRC T-1-1-5-1) and Linseed (var.T-397, Sharda, Parvati, Ruchi). The average productivity among the oilseeds was found to be the highest in Groundnut conducted in the state of Meghalaya with a production rate of 23.6 q/ha (**Fig.11**).

New Extension Methodologies and Approaches (NEMA)

The ICAR sponsored new project- “New Extension Methodologies and Approaches (NEMA)” to generate data on adoption of selected improved technologies, the determinants of adoption, constraints and impact from a large pool of samples across the country for generalization and drawing meaningful conclusion is conceived with the following objectives-

- To study the existing extension methodologies and develop new extension methodologies.
- To develop technology map for different agro-ecosystems.
- To study the extent and determinants of adoption of selected improved NARS technologies.
- To assess the impact of the technologies in different agro-ecosystems.
- To undertake yield gap analysis and suggest suitable strategies to reduce gap.

The important and popular technologies in agriculture and allied sectors in the zone have been identified and submitted to the Council for consideration. The project is at the stage of formulation and finalization of data collection instruments at national level. The core committee of Scientists for implementation of the project has been constituted as per guidelines of the project, has been formed and submitted.

Demonstration on growth performance of improved fish varieties (*Jayanti, Rohu and Amur Carp*)

National Fisheries Development Board (NFDB) initiated a programme for dissemination and promulgation of "Jayanti Rohu" and "Amur carp", which are genetically improved fish varieties in Aquaculture system of India. In order to popularize these varieties, NFDB proposed to take up field demonstrations through interested KVKs and progressive fish farmers by means of Expression of Interest (EoI). Stipulated terms of references and guidelines were drawn by the board in which the interested parties will have to follow for implementation of the programme. KVKs with Subject Matter Specialist in Fisheries were encouraged to take up the activity and also to mobilize the progressive farmers of the region for the said programme.

Table: NFDB funded capacity building/ training and demonstration programmes during the year 2016-17

Sl. No	Batch/ Sanction	No. of programs sanctioned	Amount sanctioned & released (lakhs)	No. of programs completed	Amount utilized (lakhs)	No. of beneficiaries trained
1	I	18	8.1125	16	7.01899	434
2	II	24	11.5975	24	11.5975	670
3	III	8	3.54	8	3.54	220
4	IV	2	0.92	2	0.92	50
TOTAL		52	24.17	50	23.0765	1374

Skill development activities such as capacity building programmes and training programmes were undertaken during 2016-17 which were conducted in four batches from 25 KVKs (including KVKs from Assam and Arunachal Pradesh). At present seven

KVKs (**Bishnupur, Imphal West, Imphal East, Senapati, Thoubal, Ukhrul and South Tripura)** are conducting the Demonstration of Improved fish varieties "Jayanti Rohu" and "Amur carp" under Zone VII

Seed hub on pulses in KVK-Thoubal

The Department of Agriculture, Cooperation and Farmers' Welfare, GOI has approved the project entitled, "Creation of seed hubs for increasing indigenous production of Pulses in India" funding under the centrally sponsored scheme National Food Security Mission for two years 2016-17 to 2017-18 .

Financial Report 2016-18

Sl. No	State	KVK	Amount released (2016-17)	Amount Released (2017-18)	Amount Released during 2018-19
1	Manipur	Thoubal	4000000	8750000	2250000

The KVK center could produce as much as 30.00 q of pulses seeds of black gram (PU-31) and Moong (SML-668) during Kharif, 2017 and 102.5 q of Pulse seeds such as Field Pea (Aman), Lentil (HUL-57) and Chick Pea (J4-16) in Rabi, 2017. This produced a total of 132.5 q of various pulses covering 62 ha. During 2018-19 the KVK produced as much as 50 q of pulses seeds of black gram (PU-31), Moong (SML-668) and Arhar (TS 3 R) during Kharif, 2018 and 265 q of Pulse seeds such as Field Pea (Prakash and Aman), Lentil (HUL-57) and Chick Pea (JG-16) in Rabi, 2018. This could produce a total production of 315 q covering 125 ha during the reporting period of 2018-19.

Skill Training of Rural Youth

With the request of National Institute of Agricultural Extension Management (MANAGE), Hyderabad a number of Skill Training of Rural Youth (STRY) were conducted during 2018-19. The objective of the scheme is to provide a short term (6+1 day) skill training opportunities to the rural youth including farmers and farm women in various identified skilling areas and to create a pool of skilled manpower to perform farm and non- farm operations. Funds allocated for one training program of a batch of 15 trainees (06 training days + one day travel plan) is Rs. 42,000/- (15xRs. 400x7). As per the cost norm of the STRY scheme a limit of Rs. 400/- per day per trainee is allowed, if it is residential, otherwise Rs. 250 per day per trainee is applicable.

Status of Skill Training of Rural Youth (STRY) sponsored by MANAGE (2018-19)

S. No.	State	No. of Participants	Total Budget (Rs.)
1	Manipur	459	1134000
2	Meghalaya	459	882000
3	Mizoram	396	882000
4	Nagaland	530	1134000
5	Tripura	219	504000

Doubling Farmers' Income

The Government has set a target of doubling of farmer's income by the year 2022 and the broad approach towards achieving the vision of 'Doubling of Farmers' Income by the year 2022 would be by increasing the net income from each unit of farm by reducing the cost of cultivation, increasing per unit yield and ensuring higher market return on the farmers' produce. KVKs under the jurisdiction of ICAR-ATARI, Zone-VII were advised to take a benchmark survey of 2 villages each in their respective districts and regions for the purpose of doubling the income of farmers by 2022. The details of which are given in the following table.

Two publications have also been made by the institute *viz*., **"Strategy Document on Doubling Farmers Income in Meghalaya"** and "**Technologies for Doubling Farmers' Income in NEH Region**" to serve the purpose.

Table: List of selected villages under KVKs for doubling farmer's income by 2022

S. No.	Name of State	Name of District	Name of Villages	No. of household in each village
1.	Manipur	Bishnupur	Leimaram	472
			Kumbi	88
2.	Manipur	Chandel	Chandonpokpi	40
			Modi Village	47
3.	Manipur	Imphal East	Nungbrung	320
			Huikap	860
4.	Manipur	Imphal West	Wangoi	475
			Laiphrakpam	115
5.	Manipur	Thoubal	Lourembam	242
			Ukhongshang	290
6.	Manipur	Senapati	Makhan	155
			Chawangkining	35
7.	Manipur	Ukhrul	Lungshang	100
			Lungsan	30
8.	Manipur	Tamenglong	Tupul Pt-I	70

			Charoi-chagotlong	100
9.	Manipur	Churachandpur	Saihenjang	41
			K. Salbung	75
10.	Meghalaya	Ribhoi	Umrleng	120
			Madan Nonglakhiat	184
11.	Meghalaya	East Garo Hills	Megagre Songgitcham	70
			Megagre Songgital	44
12.	Meghalaya	South Garo Hills	Dobogre	125
			Bibragre	239
13.	Meghalaya	East Khasi Hills	Tynring	200
			Pashang	63
14.	Meghalaya	West Khasi Hills	Mawkynbat	62
			Phudbah	55
15.	Meghalaya	Jaintia Hills	Niawkmai village	93
			Lumkhudung	51
16.	Meghalaya	West Garo Hills	Aminda Rangsa	52
			Aminda Simsang	92
17.	Nagaland	Peren	Deukwarma	52
			New Chalot	84
18.	Nagaland	Kohima	Nerhe Phezha	56
			New Tesophenyu	79
19.	Nagaland	Kiphre	Pelunger	225
			Langkok	40
20.	Nagaland	Dimapur	Zuheshe village	87
			Maova	130
21.	Nagaland	Tuensang	Chendang	146
			Kuthur	652
22.	Nagaland	Mokokchung	Kupza	118
			Yimchalu	40
23.	Nagaland	Mon	Langmeang	52
			Sowa changle	32
24.	Nagaland	Wokha	Koio	286
			Elumyo village	158
25.	Nagaland	Zunheboto	Litta New	64
			Zaphumi	36
26.	Nagaland	Phek	Gidemi	65
			Upper Khomi	120
27.	Nagaland	Longleng	Nyang (Old)	475
			Lingtak (New)	113
28.	Mizoram	Mamit	Rulpuihlim	90
			Darlak	234
29.	Mizoram	Kolasib	Buhchangphai	251
			Lungmuat	182
30.	Mizoram	Aizawl	Dakla Zau, Sihphir	40
			Muthi	51
31.	Mizoram	Champhai	Tuipui	100
			Chawngtlai	370
32.	Mizoram	Lawngtlai	Chawnhu	173
			Thingkah	284
33.	Mizoram	Saiha	Noaotlah – III	63
			Riasikah	36
34.	Mizoram	Lunglei	Rawpui	170
			Tuipui 'D'	100
35.	Mizoram	Serchhip	Chekawan	55

			Lungchhuan	152
36.	Tripura	Khowai	North Krishnapur	851
			East Ramchandra Ghat	1124
37.	Tripura	North Tripura	Khudrakandi West,Uptakhali	114
			Halambasti, Madhuban ADC vill.	85
38.	Tripura	South Tripura	West Pillak	220
			Paikhola	215
39.	Tripura	West Tripura	Brajabashipara	60
			Dumtipara	115
40.	Tripura	Dhalai	Dabbari	400
			Maharanipur	579
41.	Tripura	Sepahijala	Latiacherra	429
			Chikoncherra	670

Awareness programme on *Pradhan Mantri Fasal Beema Yojana* Programme (PMFBY)

During 2016, 35 KVKs under ICAR-ATARI, Umiam organised the Awareness programme on PMFBY wherein 10006 nos. of farmers took part across 5 hill states of the region

Achievements of the Awareness programme on PMFBY during 2016

State	No. of KVK	No. of Participants						No. of exhibition organized
		No. of state govt. ministers	No. of Honble MP	No. of MLA	No. of Distt. Collector	No. of Bank officials	No. of farmers	
Manipur	9	0	2	2	1	3	1732	41
Meghalaya	5	0	1	5	0	1	1089	35
Mizoram	8	1	1	0	2	11	2414	5
Nagaland	9	1	1	1	3	3	3135	11
Tripura	4	0	1	4	0	4	1636	7
Total	35	2	6	12	6	22	10006	99

Jal Shakti Abhiyan

Jal Shakti Abhiyan (JSA)- A water Conservation Campaign was launched on 1st July, 2019 for creating awareness among all stakeholders including farmers on water conservation and rainwater harvesting for increasing the water use efficiency in various sub-sectors of agriculture including cultivation of field crops, horticultural crops, animal husbandry and other allied and subsidiary occupations.

State wise data of Jal Shakti Abhiyan (JSA)

S. No.	Name of State	Number of Kisan Mela organised	No. of blocks	No. of participants
1	Manipur	1	1	260
2	Meghalaya	2	2	1538
3	Mizoram	5	2	1400
4	Nagaland	1	1	120
5	Tripura	5	5	440

As part of this Abhiyan, the Government has decided that all KVKs in selected 254 districts of the country shall organize Kisan Melas on the optimum usage of water in farming with focus on increasing the water-use efficiency by adopting different methods like drip irrigation for more crop per drop; conservation and harvesting of rainwater; smart irrigation scheduling; raising of drought tolerant varieties and shifting towards less water consuming crops; conservation tillage and cultural practices for water conservation and saving; composting and mulching; growing of cover crops *etc.*

Five KVKs, viz. Senapati, East Garo Hills, Saiha, Longleng and Khowai under ICAR-ATARI, Umiam was identified for organising Kisan mela during the Abhiyan. Moreover, all the KVKs of the zone organised various awareness programme on water conservation during Swachhata Hi Sewa programme (September 11-October 02, 2019).

Krishi Kalyan Abhiyan

Krishi Kalyan Abhiyan, a program focused on giving a boost to agriculture and allied activities in the selected aspirational districts. A ten point action plan comprising of activities of the three departments Department of Agriculture Cooperation and Farmers Welfare (DACFW), Department of Animal Husbandry, Dairy and Fisheries (DAHDF) and Department of Agricultural Research and Education (DARE) implemented during this period with *Krishi Vigyan Kendras* as the nodal point. After the successful implementation of *Krishi Kalyan Abhiyan-I*, the second phase of *Krishi Kalyan Abhiyan-II* was started from 2nd October 2018 to 25th December 2018 with the following twelve points of action plan.

- Distribution of Soil Health Cards to all farmers
- Distribution of Mini Kits of pulses and oilseeds to all
- Distribution of Horticulture/Agro Forestry/Bamboo plant @ 5 per family (location appropriate)
- Construction of NADAP Pits in each village

- Bovine vaccination for Foot and Mouth Disease (FMD) in each village
- Vaccination of Sheep and Goat for eradication of Peste des Petits ruminants (PPR)
- Artificial insemination saturation
- Distribution of agricultural implements
- Demonstration of integrated cropping practice
- Demonstration of programme on Micro irrigation
- Organizing awareness campaign for PMFBY
- Training programmes in each of the villages by ICAR/KVKs in these areas: Bee keeping, mushroom cultivation, kitchen garden, animal sciences, Fishery sciences, horticultural sciences, vermicompost, NADEP, value addition, micro irrigation PMFBY, IPM, IFS

Table: Details of activities under *Krishi Kalyan Abhiyan*

Sl. No	Activities	Quantity	No. of beneficiary
1	Distribution of Soil Health Cards to all	18133	13009
2	Distribution of mini kits of pulses and oilseeds	10995	9738
3	Distribution of Horticulture/Bamboo Plants	115510	31811
4	Construction of NADEP Pits	2182	2306
5	FMD Vaccination (Bovine)	52898	34826
6	Vaccination of Sheep & Goat for eradication of PPR	29606	22461
7	Artificial Insemination	4554	3285
8	Training Program in the villages by KVKs	672	25750
9	Distribution of agricultural implements	5496	5522
10	Demonstration of integrated cropping practice	12	862
11	Demonstration of programme on Micro irrigation	7	238
12	Organizing awareness campaign for PMFBY	156	2925

Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)

With a view to provide income support to all small landholding farmers' families across the country and to enable them to take care of expenses related to agriculture and allied activities as well as domestic needs the Central Government has started the Pradhan *Mantri Kisan Samman Nidhi* (PM-KISAN) Scheme. The Honorable Prime Minister inaugurated the *Pradhan Mantri Kisan Samman Nidhi* on the 24th February 2019. The KVKS under ICAR ATARI Zone-VII had invited 200-300 farmers to view the inauguration programme aired through webcast for the benefit of the farming community. A total of

1169 number of farmers viewed the programme across three states *i.e* Meghalaya, Manipur and Tripura.

Table: Details of Telecast/Webcast of inauguration of PM Kisan Samman Nidhi Scheme

Sl. No.	Name of the State	Name of Institutes	Total number of farmers viewed the programme
1	Meghalaya	ICAR RC for NEH, Umiam	119
2	Tripura	ICAR RC for NEH Region, Tripura Center	350
3	Manipur	ICAR RC for NEH Region, Manipur Centre	300
4	Manipur	Central Agricultural University (CAU), Imphal	400

Pradhan Mantri Kisan Maan-Dhan Yojana (PM-KMY)

The *Pradhan Mantri Kisan Maan-Dhan Yojana* (PM-KMY), announced during the Budget 2019-20 was effective from 9th August, 2019. This scheme is a voluntary and contributory pension scheme for the entry age group of 18 to 40 years for small and marginal farmers in which after attaining the age of 60 years the farmer will get a monthly pension of rupees 3,000. The farmers having a cultivable land 2 hectares are eligible to enroll for the scheme at the common service Centres (CSCs) in their villages. The ICAR had organized a function at KVK level on 11th September, 2019, to sensitize the farmers on this scheme. Accordingly all the KVKs of the zone organized this programme.

PKVY (Paramparagat Krishi VikasYojana) - Organic farming

Paramparagat Krishi Vikas Yojna (PKVY) is a sub-component of Soil Health Management (SHM) scheme under National Mission of Sustainable Agriculture (NMSA) and it aims at development of sustainable models of organic farming through a mixture of traditional wisdom and modern science and technology to ensure the long term soil fertility buildup, resource conservation and helps in climate change adaptation and mitigation. The objectives of PKVY are to promote natural resource based integrated and climate resilient sustainable farming systems that ensure maintenance and increase of soil fertility, reduce cost of agricultural operations to farmers through sustainable integrated organic farming systems and enhancing farmer's net income, production of quality food, empower farmers through institutional development in the form of clusters and groups, protect the environment and creation of direct market linkages.

37 KVKs under ICAR-ATARI, Umiam have been selected for conducting cluster demonstration in 25 ha cluster per KVK. The following are some of the interventions identified by the KVKs for demonstration.

Activities to be carried out by KVKs during 2019-20

Sl. No	Name of the KVK	Major crops / interventions	Area (ha)	Amount Released (Rs.)
Manipur				
1.	Chandel	Indigenous Maize- Broad bean, Rice – French bean	20	330000
2.	Churachandpur	Khasi mandarin, Pineapple, Banana, Pea, Rapeseed Mustard, Broccoli , Cabbage, Tomato, Chickpea, Rajma		330000
3.	Imphal East	Papaya, Pea, Black rice	20	330000
4.	Imphal West	Pineapple- red gram, Ginger, garden pea, Garlic, French bean, Black rice, Broad bean/ cucurbits	20	330000
5.	Tamenglong	Tamenglong Orange, Cabbage, Mustard/ Toria	20	330000
6.	Ukhrul	Kiwi, Turmeric, Ginger, Pea/ Broad bean	20	330000
7.	Thoubal	Pineapple, Ginger, Turmeric, Black rice	20	330000
8.	Senapati	Kiwi, Pineapple, Citrus, Broccoli, Cabbage, Cardamom, Ginger, Turmeric	20	330000
Meghalaya				
9.	Ri-Bhoi	Pineapple, Khasi Mandarin	20	330000
10.	West Garo Hills	Khasi Mandarin, Ginger, Turmeric, Paddy, Green gram and Arhar, Vegetables	20	330000
11.	East Garo Hills	Pineapple, Ginger, pea	20	330000
12.	South Garo Hills	Khasi Mandarin Silki, Black pepper, Rapeseed mustard	20	330000
13.	East Khasi Hills	Papaya, Ginger, Paddy	20	330000
14.	Jaintia Hills	Ginger, Turmeric, Pea	20	330000
15.	West Khasi Hills	French bean, Chilli, Carrot, coriander, Paddy	20	330000
Mizoram				
16.	Champai	Grapes, French Bean, Mizo Chilli, Soy bean	20	330000
17.	Saiha	Mandarin Orange, Cabbage, Soybean	20	330000
18.	Kolasib	Turmeric, Sacha Inchi (medicinal plant)	20	330000
19.	Lawngtlai	Banana, Cabbage, Rajmah	20	330000
20.	Lunglei			330000
21.	Mamit	Pineapple, Cabbage, Field Pea	20	330000

22.	Aizawl	Dragon fruit, Papaya , Broccoli , Pea , Bean	20	330000
Nagaland				
23.	Dimapur	Banana	20	330000
24.	Kiphire	Maize followed by Rajmah	20	330000
25.	Longleng	Orange, Mango, Litchi, Large cardamom, Guava, Coffee, Maize, French bean, Soybean	20	330000
26.	Peren	Pineapple	20	330000
27.	Kohima	Mandarin, Paddy	20	330000
28.	Mon	Khasi Mandarin, Broccoli, Toria (TS-38)	20	330000
29.	Tuensang	Citrus, Ginger, Soyabean	20	330000
30.	Phek	Kiwi, Potato, French bean, Large cardamom, Maize, Soybean	20	330000
31.	Zunheboto	Kiwi, Orange, Soybean	20	330000
32.	Wokha	Mandarin, Ginger, Maize	20	330000
Tripura				
33.	South Tripura	Banana, Cabbage, Rice, Lemon (scented), Tomato, Ginger	20	330000
34.	West Tripura	Garden pea, Tomato, Rice	20	330000
35.	Dhalai	Paddy	20	330000
36.	North Tripura	Pineapple, Okra, Black gram	20	330000
37.	Khowai	Papaya, Pineapple, Paddy	20	330000

Tree Plantation campaign

Tree plantation campaign was taken up in 42 KVKs under ICAR-ATARI, Umiam across five north eastern states *i.e* Manipur, Meghalaya, Mizoram, Nagaland and Tripura.

State wise data of the Tree plantation campaign

State	Number of KVKs Organized program	Number of MPs Attended program	Number MLAs Attended program	Number of Other VIPs	No. of Farmers attended program	Total participants	Number of plants distributed
Manipur	9	1	7	20	791	828	4213
Meghalaya	7	Nil	Nil	8	526	502	3147
Mizoram	8	Nil	Nil	19	877	987	3878
Nagaland	11	nil	1	30	926	1017	5037
Tripura	7	Nil	2	45	886	780	3725
Total	42	1	10	122	4006	4114	20000

A total of 4114 numbers of farmers participated in the programme. Various types of fruit, ornamental, avenue tree and agro-forestry saplings were distributed to the farmers like

Bahunia vahili, Mango, Guava, *Alstonia scholaris*, *Michelia champaka*, papaya and other avenue trees were distributed to the farmers during the day long programme on September 17, 2019.

National Animal Disease Control Programme (NADCP)

The Prime Minister launched a country-wide workshop in all the Krishi Vigyan Kendras (KVKs) throughout the 687 districts of the country on 'vaccination and disease management, Artificial Insemination and Productivity'and National Animal Disease Control Programme (NADCP) for FMD & Brucellosis and National Artificial Insemination Programme was held on the 11th of September 2019.

National Animal Disease Control Programme (NADCP) campaign was organised on 11th September, 2019 in all the KVKs of under Zone VII, across five states *i.e* Manipur, Meghalaya, Mizoram, Nagaland and Tripura in collaboration with the State Veterinary and Animal Husbandry Department. A total number of 3428 farmers participated in the programme. 342 animals were injected for artificial insemination. And a total number of 3148 animals were vaccinated against **Foot & Mouth Disease (FMD)** and **Brucellosis**

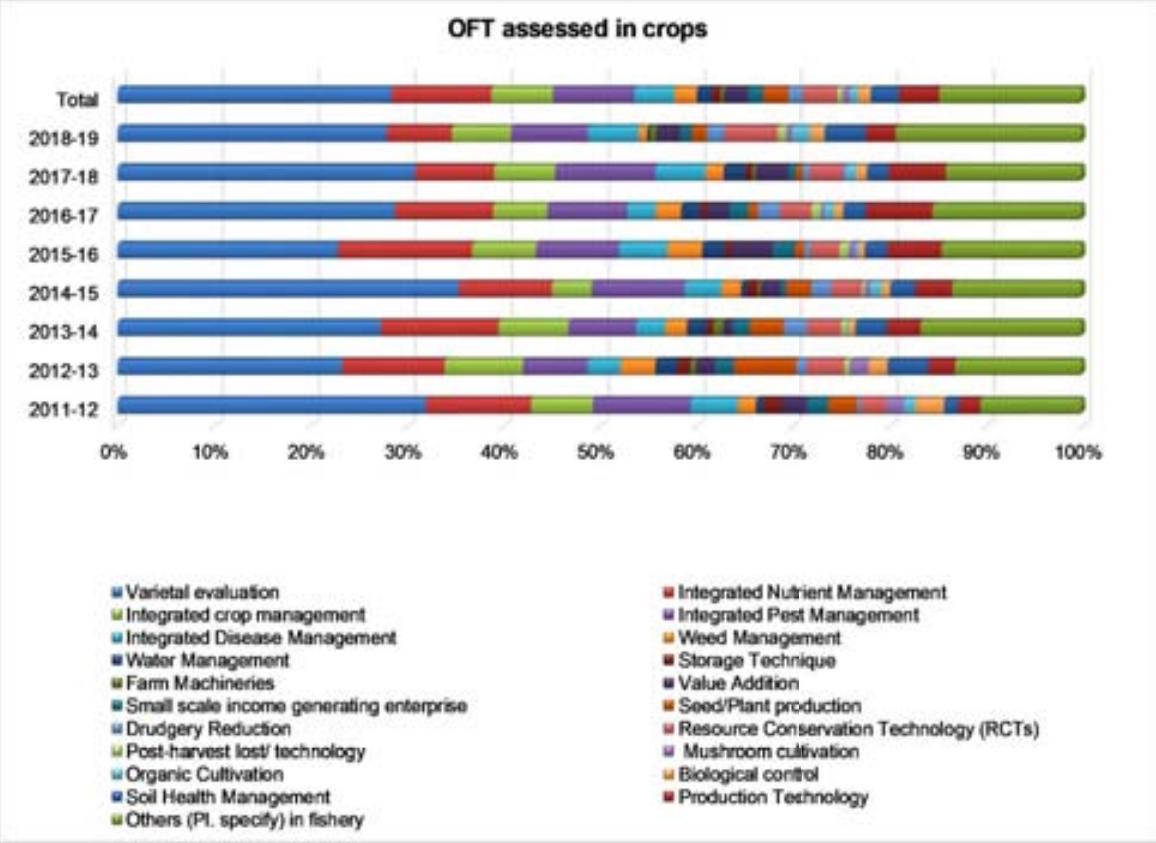
State wise data of NADCP

S. No.	Name of State	No. of Farmers Participated	No. of VIPs	No. of other Dignitaries	No. of Animals injected for AI	No. of Animals Vaccinated
1	Manipur	491	20	20	80	192
2	Meghalaya	901	11	50	50	59
3	Mizoram	658	4	14	155	137
4	Nagaland	555	6	27	1	1186
5	Tripura	823	12	29	56	290

Technical Achievements

Technology Assessment and Refinement in Crops

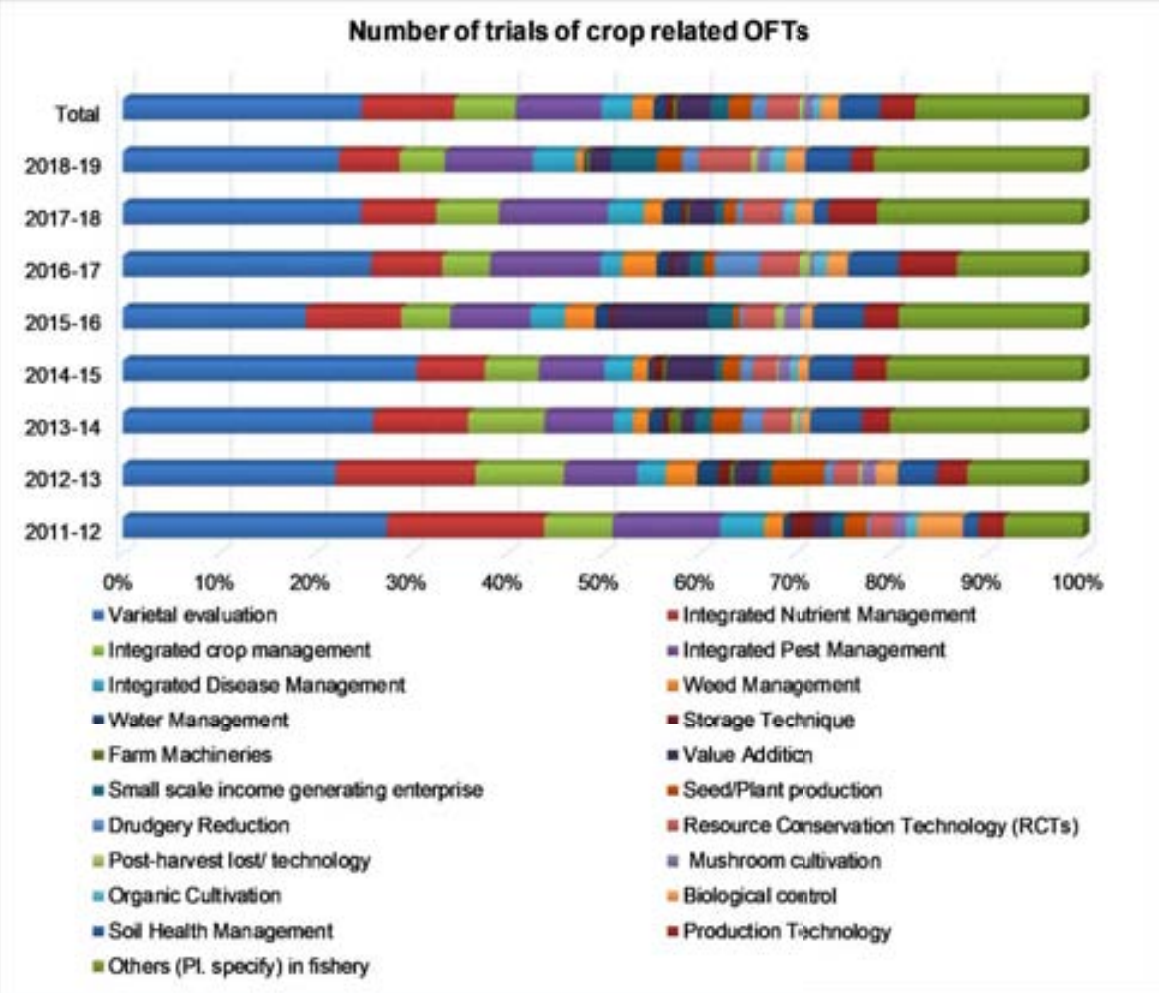
The graph presented below revels that the No. of OFTs conducted by KVKs under ICAR-ATARI during 2012-19 on varietal evaluation of different crops is in the range of 23-30% followed by 8-15 % in integrated nutrient management. It is also observed that important interventions such as resources conservation technology (RCTs), value addition/post-harvest technology of crops and water management has not been followed widely by the KVKs throughout the years. However, RCTs activities have been shown to have almost doubled during 2018-19 as compared to previous years.



Number of trials of crop related OFTs

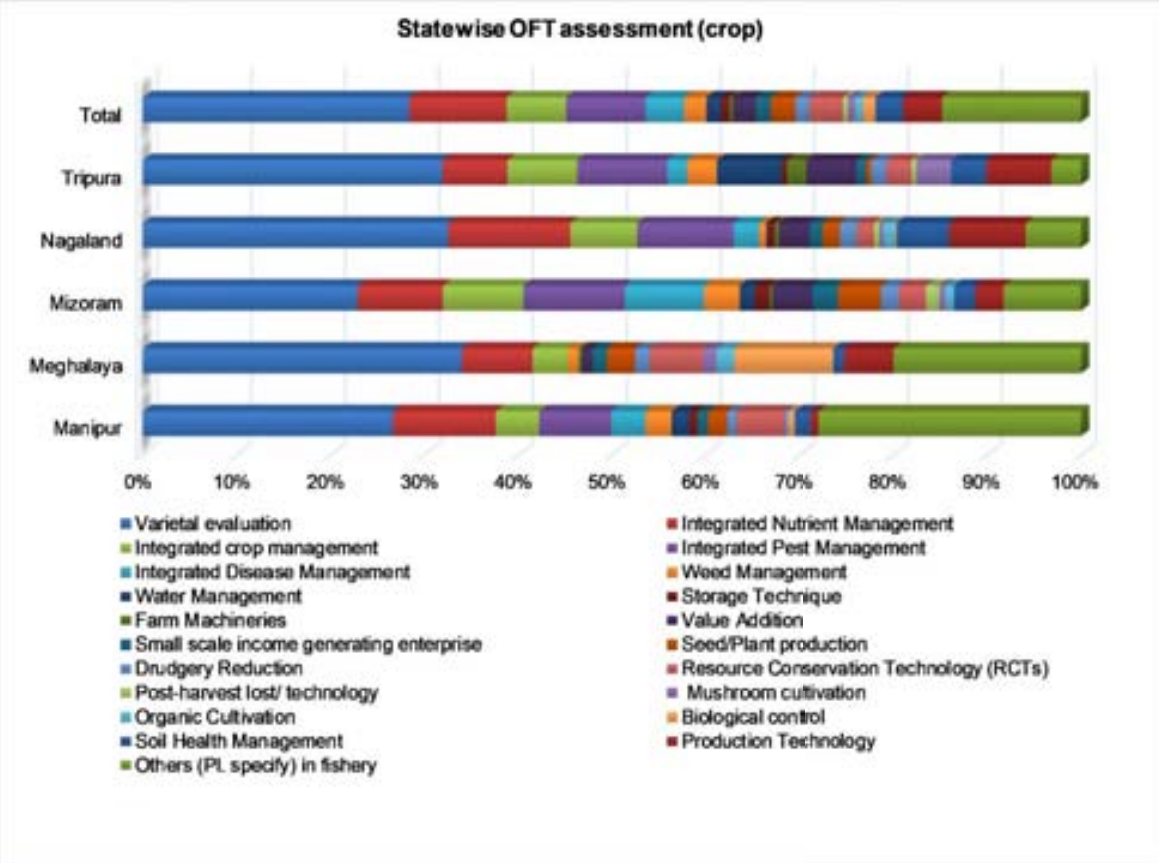
The number of trials for small scale income generating enterprises has increased from 10 trials during 2017-18 to 66 trials in 2018-19. The reason for increasing trend for small scale income generating enterprises activities is because of the fact that the government is pressing towards doubling the income of farmers by the year 2022. Another activity

that shows an increasing trend in terms of number of trials is Resources Conservation Technology (RCTs).



State-wise OFT assessment (crops)

The figure below clearly revels that the varietal evaluation of crops is widely followed by KVKs in all the states. However, the KVKs of Meghalaya conducted more number of trials followed by Nagaland and Tripura. Another OFT which has been widely conducted irrespective of states is the Integrated Nutrient Management (INM) of crops. KVKs in Manipur have more number of trials under INM followed by Nagaland and Mizoram. Trials on organic cultivation are comparatively low in all the KVKs irrespective of states and however, the highest number of trials was conducted by KVKs in Nagaland followed by Mizoram and Meghalaya.

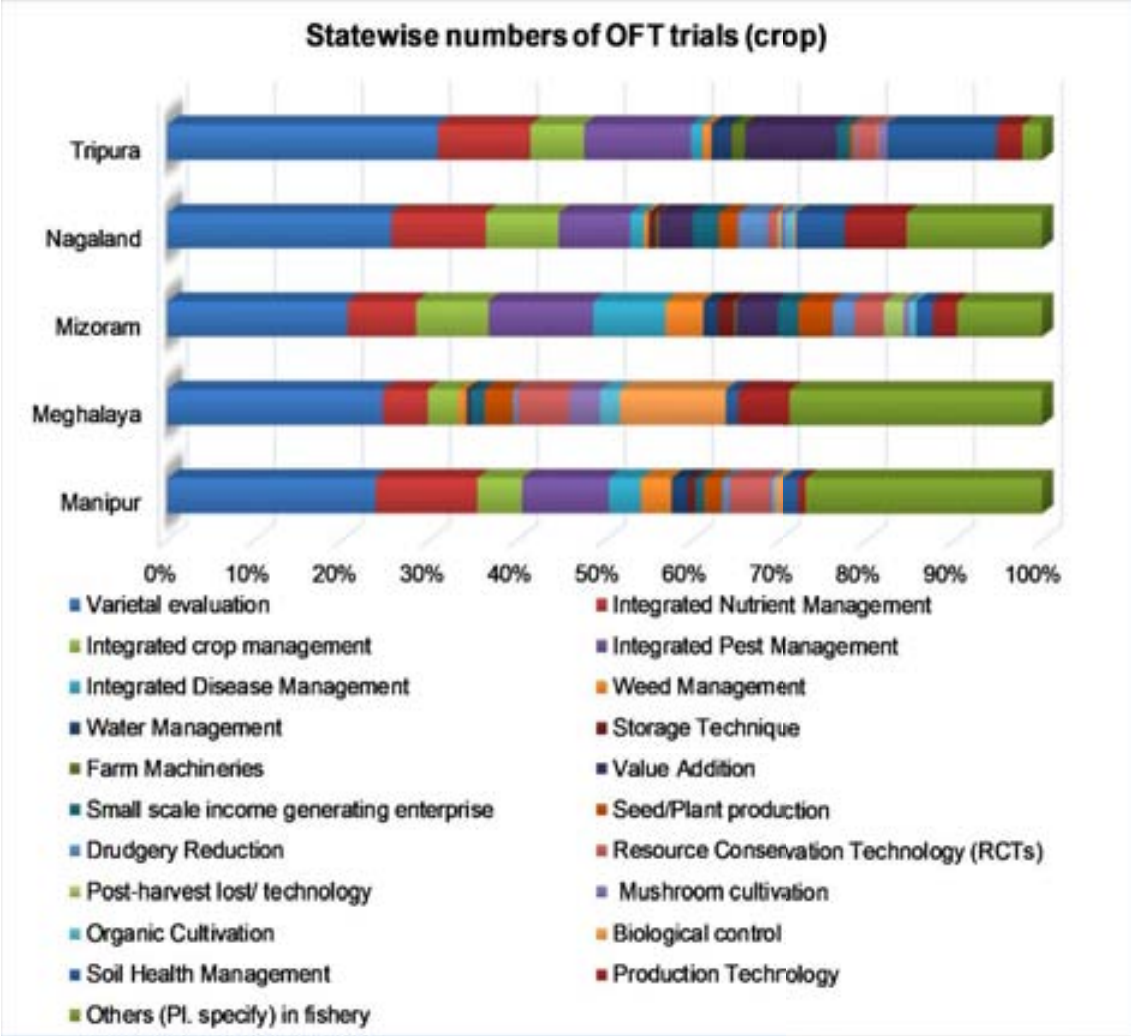


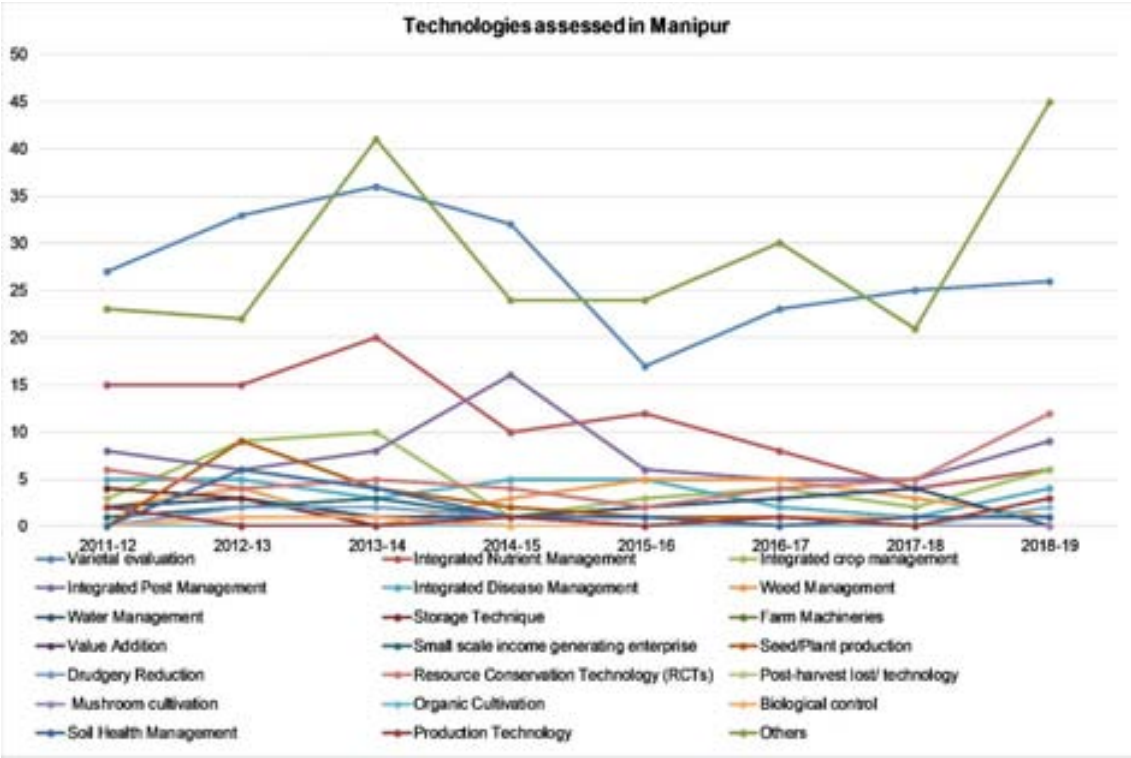
State-wise numbers of OFT trials (crop)

For the state of Manipur the highest numbers of OFT conducted was recorded for others followed by varietal evaluation and INM. Similarly for Meghalaya the highest number of trials was recorded for others followed by varietal evaluation and biological control. Number of trials in Mizoram shows highest in terms of varietal evaluation followed by IPM. In Nagaland, the highest number of trials was recorded in varietal evaluation followed by others and INM. Tripura records highest number of trials in varietal evaluation followed by Soil Health Management and IPM.

Technologies assessed in Manipur

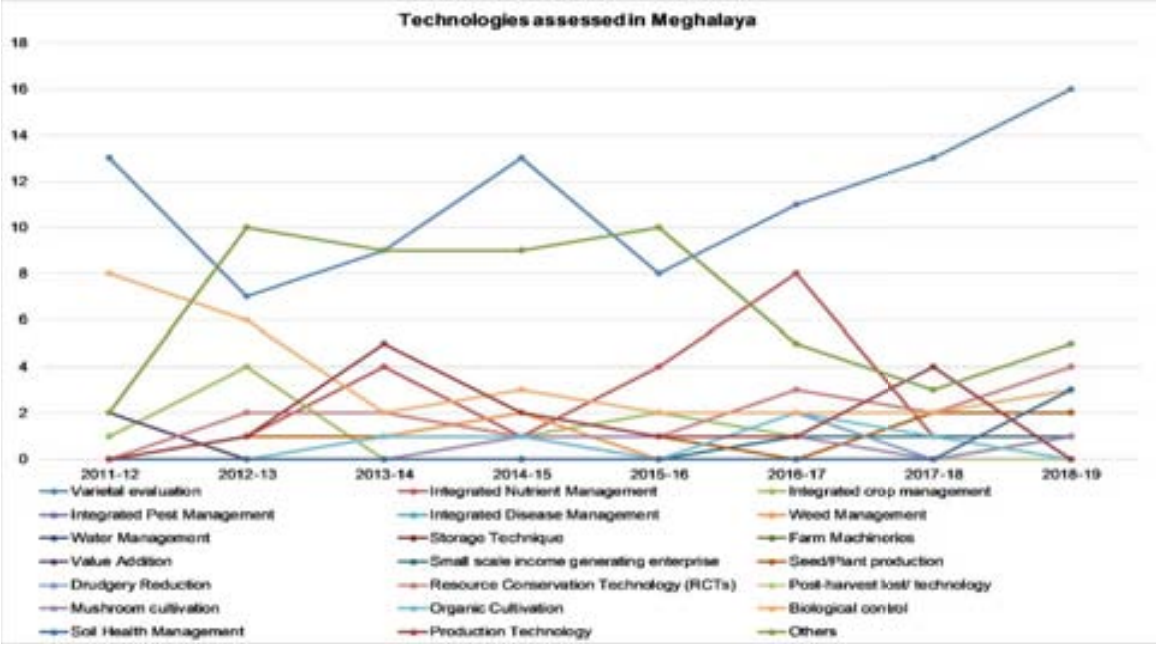
Highest number of technologies assessed for the state of Manipur was recorded for others during 2018-19 followed by 2013-14. In the case of varietal evaluation, highest number of technologies assessed was during 2013-14 followed by 2012-13. Soil health management and other production technology were found to be least in KVKs in the state of Manipur.

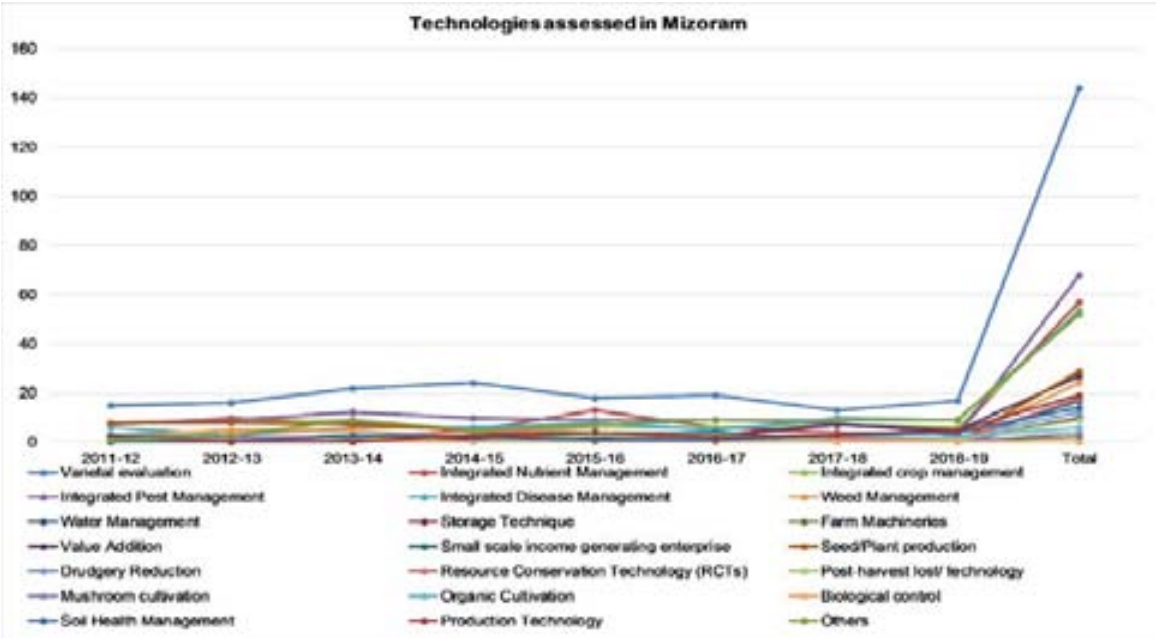

Statewise numbers of OFT trials (crop)
Tripura
Nagaland
Mizoram
Meghalaya
Manipur
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Varietal evaluation
Integrated Nutrient Management
Integrated crop management
Integrated Pest Management
Integrated Disease Management
Weed Management
Water Management
Storage Technique
Farm Machineries
Value Addition
Small scale income generating enterprise
Seed/Plant production
Drudgery Reduction
Resource Conservation Technology (RCTs)
Post-harvest lost/ technology
Mushroom cultivation
Organic Cultivation
Biological control
Soil Health Management
Production Technology
Others (Pl. specify) in fishery


Technologies assessed in Manipur
50
45
40
35
30
25
20
15
10
5
0
2011-12
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
Varietal evaluation
Integrated Nutrient Management
Integrated crop management
Integrated Pest Management
Integrated Disease Management
Weed Management
Water Management
Storage Technique
Farm Machineries
Value Addition
Small scale income generating enterprise
Seed/Plant production
Drudgery Reduction
Resource Conservation Technology (RCTs)
Post-harvest lost/ technology
Mushroom cultivation
Organic Cultivation
Biological control
Soil Health Management
Production Technology
Others

Technologies assessed in Meghalaya

As per the figure, it shows that the highest numbers of technologies assessed by KVKs in Meghalaya is varietal evaluation during 2018-19 and Soil health management was least.



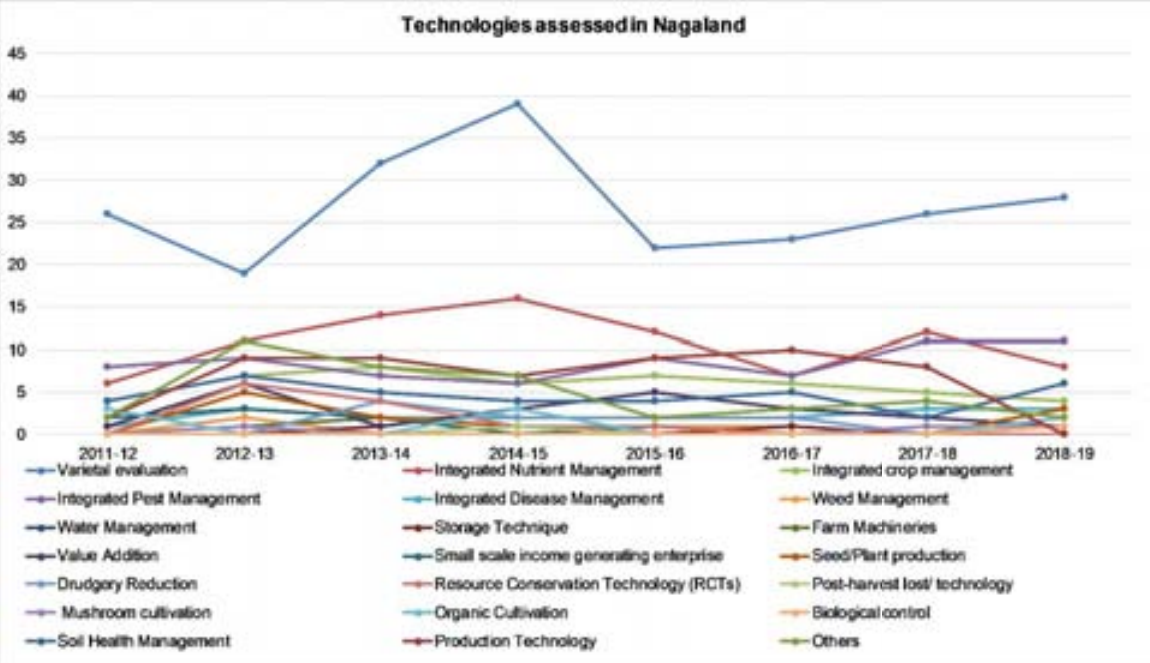


Technologies assessed in Mizoram

The figure above revels that the highest no. of OFTs was conducted in the field of varietal evaluation during the period under report by the KVKs in the state followed by integrated nutrient management.

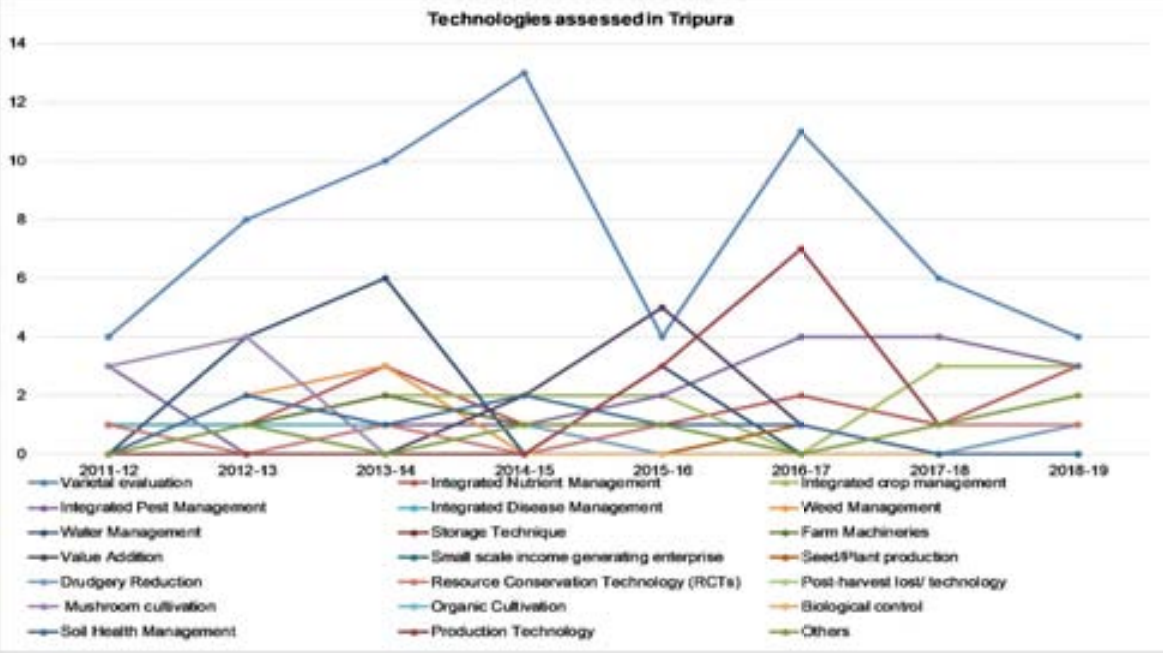
Technologies assessed in Nagaland

The figure below clearly indicates similar kind of trend to that of Mizoram. The highest no. of OFTs (20-38%) was conducted in the field of varietal evaluation during 2011-2019 followed by Integrated nutrient management (8-15).



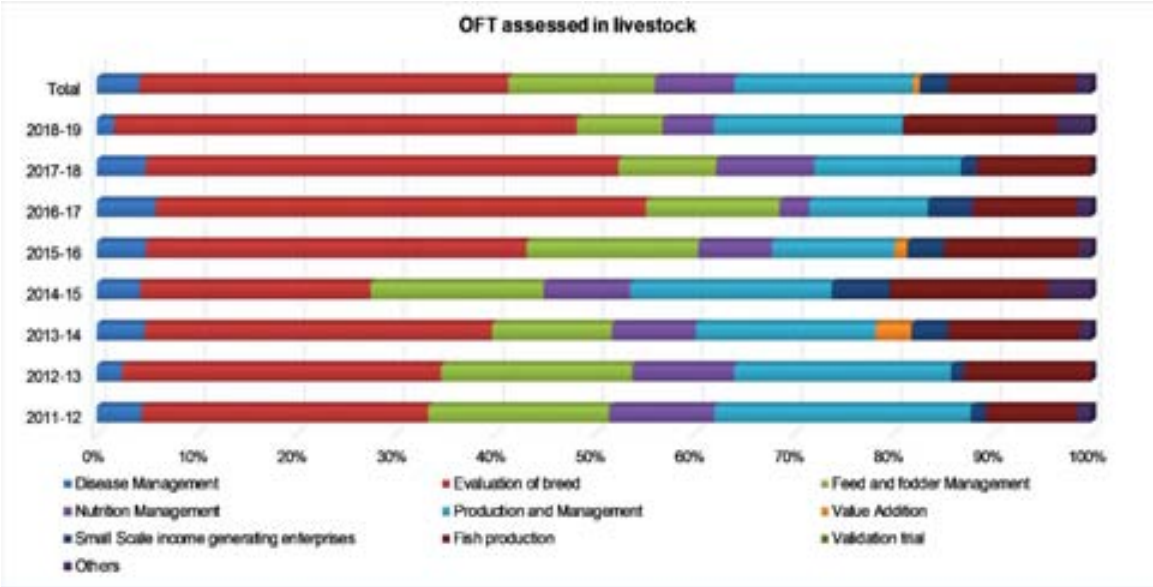
Technologies assessed in Tripura

Similar trend has also been observed in Tripura. The highest no of OFTs was conducted in the field of varietal evaluation (4-13%).



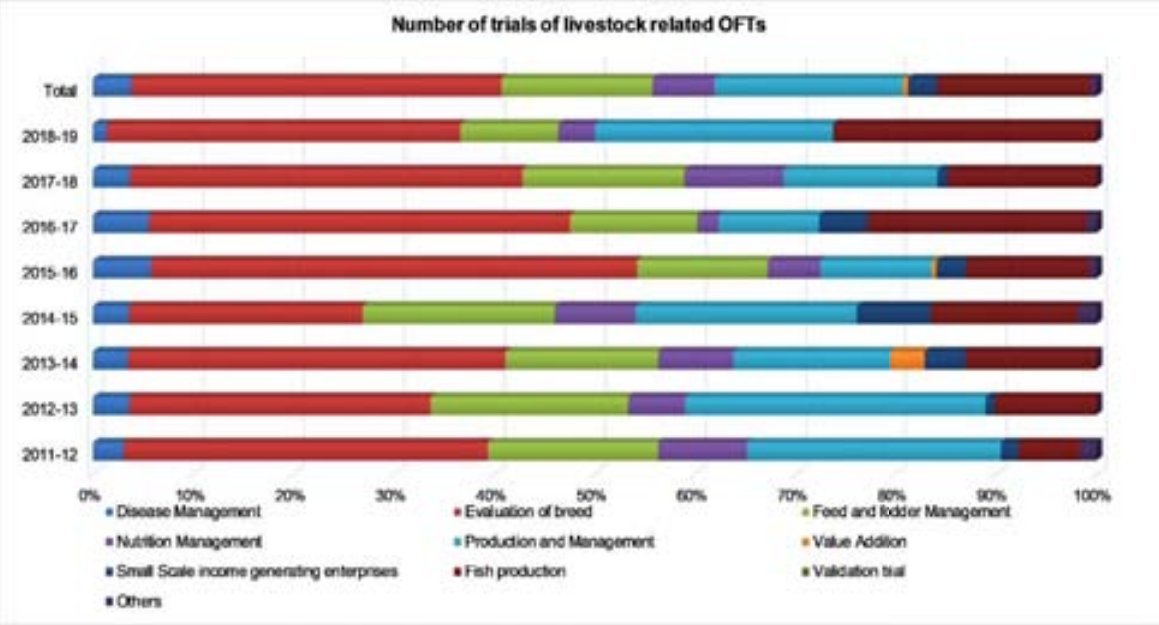
Technology Assessment and Refinement in Livestock sector

As per data depicted in the figure below indicates that more number of assessments were made in the field of evaluation of breeds followed by production and management. The highest recorded assessment on evaluation of breeds was during the year 2015-16.



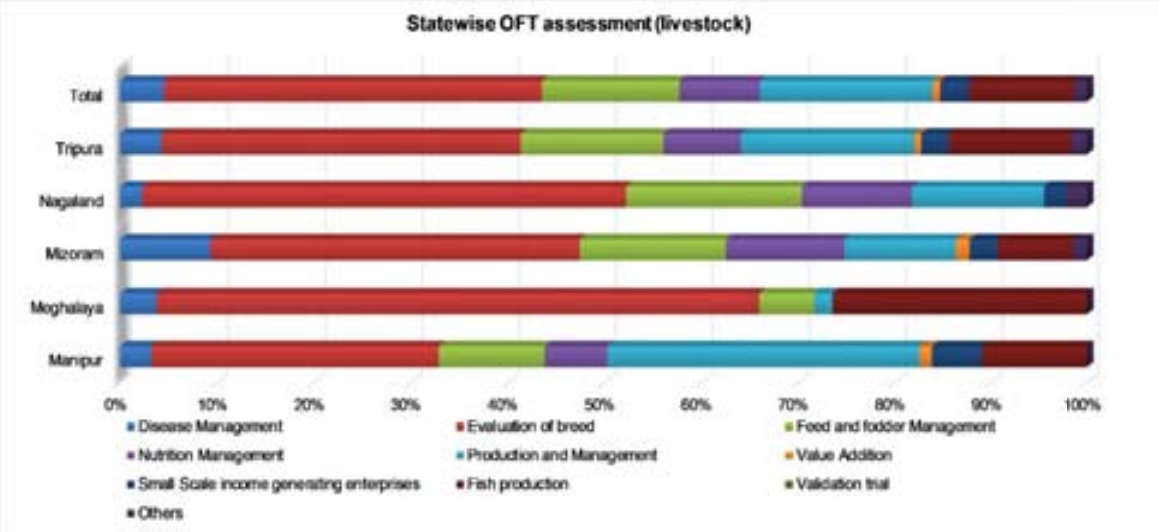
Number of trials of livestock related OFTs

In the case of number of trials conducted, the figure indicates dominance in the evaluation of breeds all throughout the years. The number of trials conducted under production and management were also high followed by fish production in most of the years. The least number of trials conducted was under value addition in terms of livestock related OFTs.



State wise OFT assessment (livestock)

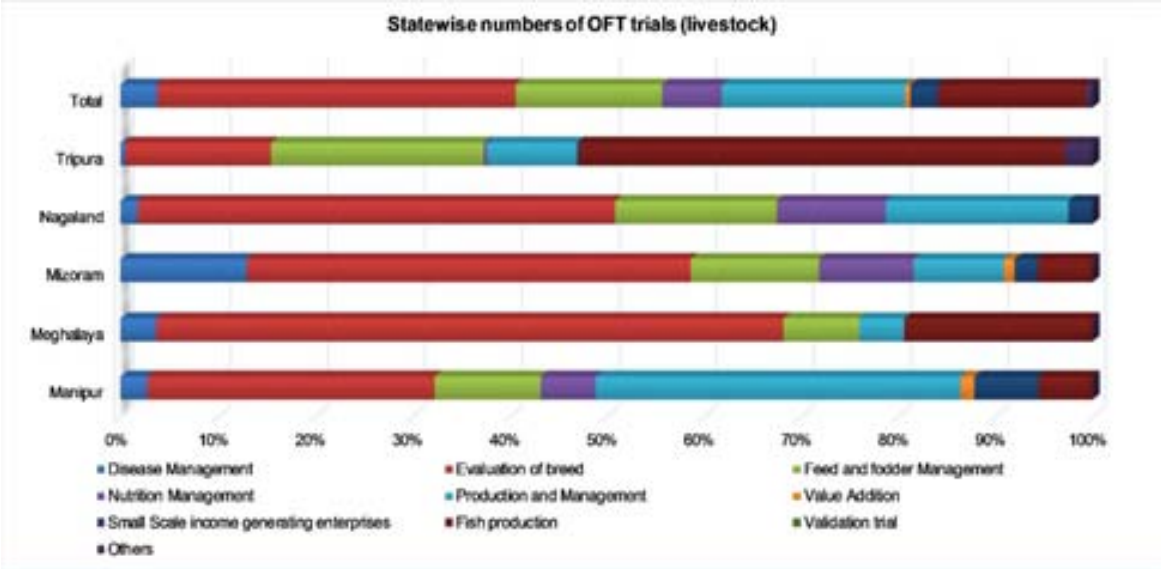
As per the figure, we can say that the highest number of assessment was recorded by KVKs of Meghalaya under evaluation of breeds. In almost all of the KVKs, assessment on evaluation of breeds seems to dominate. The second most assessed technology was production technology followed by feed and fodder management.



State wise numbers of OFT trials (livestock)

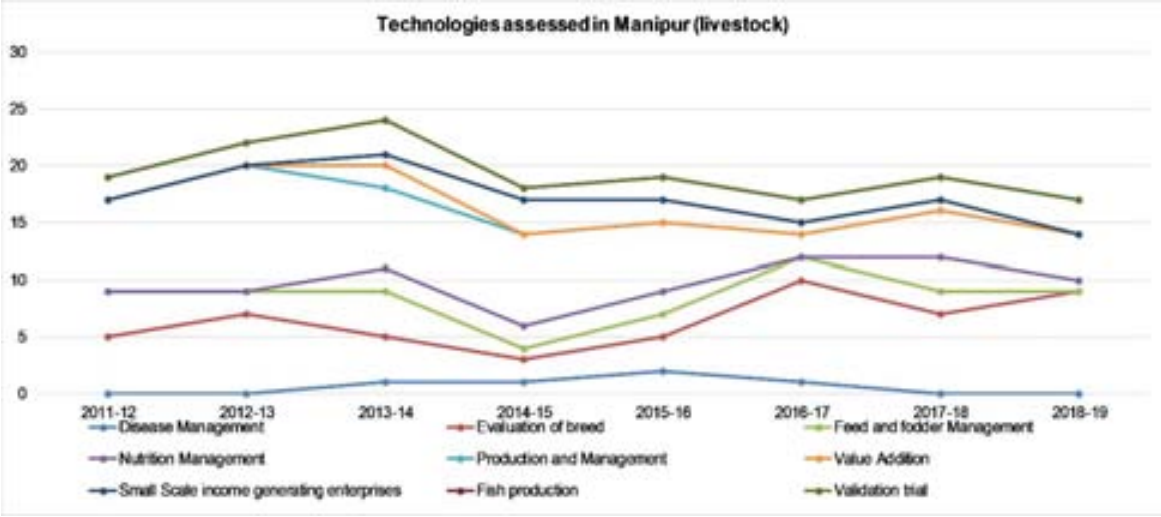
The number of trials as depicted in the figure shows that the highest OFT trials under livestock was in Meghalaya for evaluation of breed. Number of trials for evaluation of breeds is also more for the state of Nagaland and Mizoram as compared to other technologies. Number of trials on production and management shows highest for the

state of Manipur and number of trials under fish production technology shows highest for the state of Tripura.



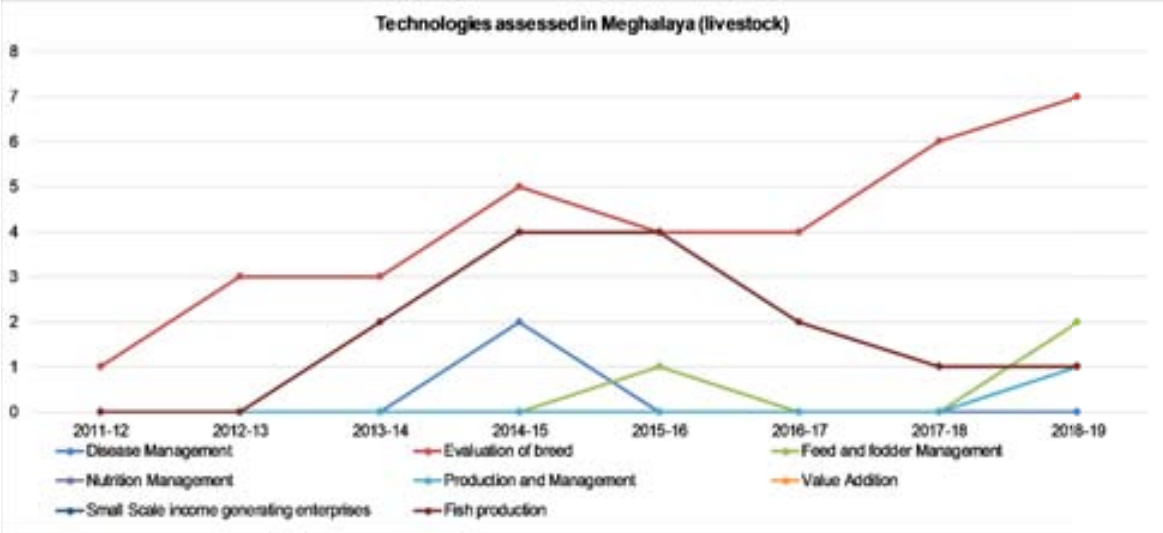
Technologies assessed in Manipur (livestock)

As per the data indicated in the figure, technologies assessed under production management shows highest values during the initial years and technologies assessed under evaluation of breed shows a trend of gradual increase over the years. Other technologies show a somewhat constant trend over the years.



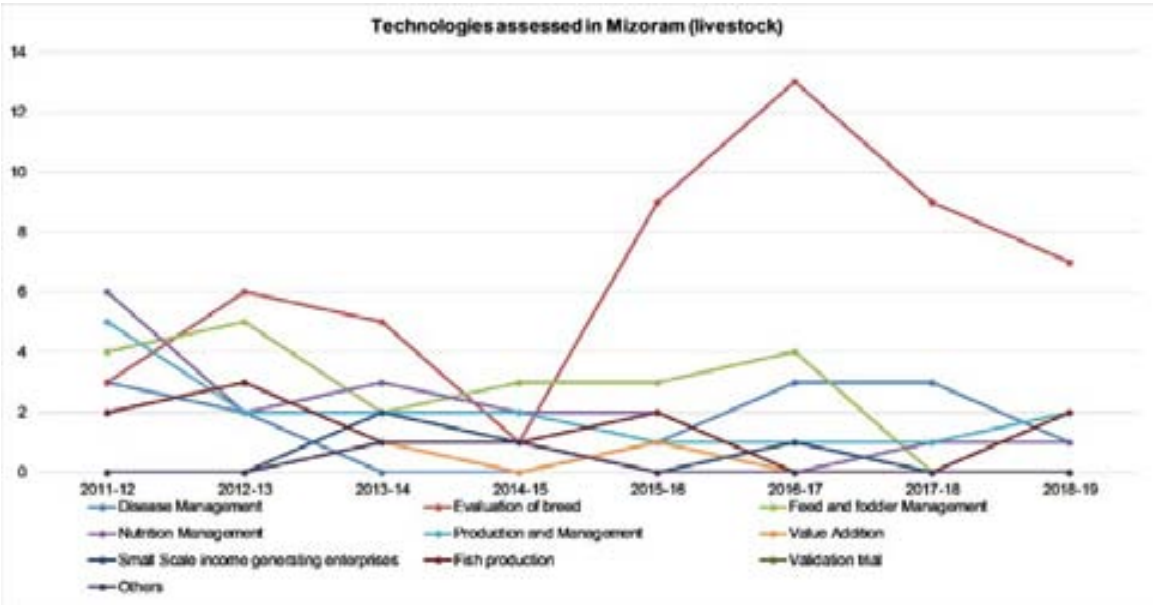
Technologies assessed in Meghalaya (livestock)

The figure presented below indicates that the technology on evaluation of breed is highest for KVKs in Meghalaya followed by technologies on fish production.



Technologies assessed in Mizoram (livestock)

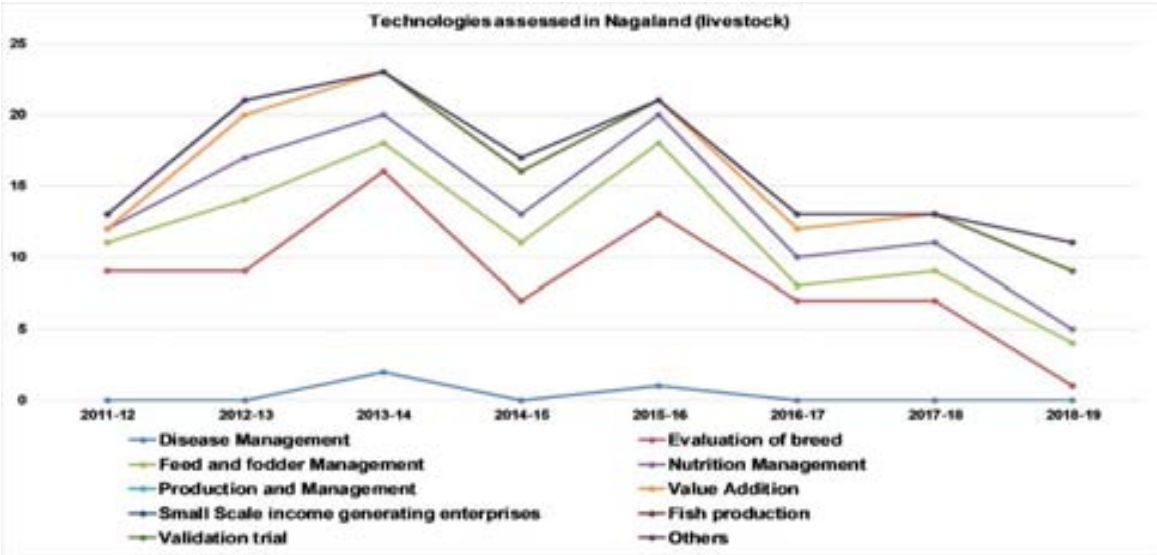
Number of technologies assessed under livestock is more in the field of breed evaluation in KVKs of Mizoram. The highest no. of assessment was during the year 2016-17. The second highest assessment of technology is the feed and fodder management which is recorded highest during the year 2012-13.



Technologies assessed in Nagaland (livestock)

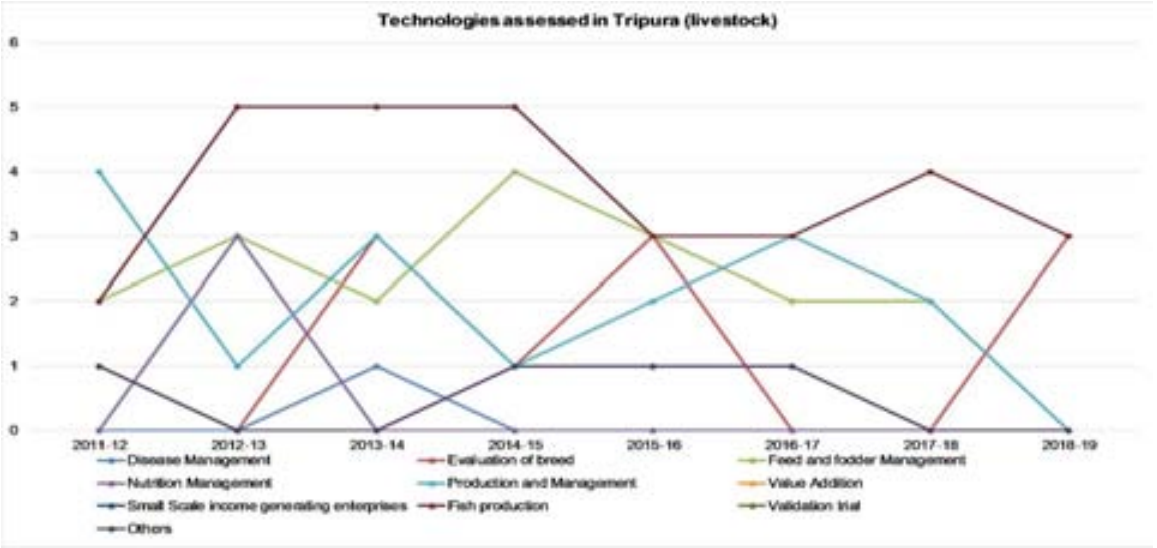
The figure describes the dominance of assessment of technology under evaluation of breed in KVKs under Nagaland. However, the trend of the technology assessment seems to decrease over the years from 14 assessments during 2013-14 to only one assessment during 2018-19. Another important technology assessed by the KVKs in the

state is the feed and fodder management and technology on production management which also seem to be in decreasing trend over the years.



Technologies assessed in Tripura (livestock)

The data presented in the figure below revels that the assessment of technology under fish production seems to dominate over other technologies over the the years. However, the trend seems to dip from the year 2014-15 onwards. The second most assessed technology is the feed and fodder management.



Suitable technologies identified for doubling farmers' income in the states under the jurisdiction of ICAR-ATARI, Umiam (Zone-VII)

S.No	Contents	Technology popularized by KVK
1.	Single Bud Transplanting Technique of Ginger & Turmeric to Reduce Seed Cost	Ri Bhoi
2.	Productivity and profitability in maize based intercropping system	Imphal West
3.	Use of Pusa Hydrogel for management of moisture stress in direct seeded Onion	West Garo Hills
4.	Integrated Pest Management in rice	Ukhrul
5.	Integrated weed management in rice	Chandel
6.	Management of Shoot borer and termite in sugarcane	Thoubal
7.	Integrated nutrient management in soybean	Imphal West
8.	Use of *Trichoderma viridae* for controlling *Rhizoctonia* rot in pea	Jaintia Hills
9.	Biological management of late blight disease in Potato	East Khasi Hills
10	Indigenous Traditional Knowledge (ITK) for management of Gundhi bug in rice	East Khasi Hills
11	Performance of French Bean Var. Arka Anoop &Arka Suvidha	West Garo Hills
12	Effect of *in situ* green manuring with soy bean on Ginger production in terraces	Kolasib
13	Integrated Pest Management (IPM) practices for Stem borer & Leaf folder in Rice	Kolasib
14	Rejuvenation of Citrus orchard	Lunglei
15	High density planting of banana var. Giant Cavendish	Mamit
16	Cultivation of tomato under protected condition	Mamit
17	Integrated nutrient management to boost the yield in Mustard	Dimapur
18	Enhance the livelihood security through Gerbera production under protected condition	Longleng
19	Improved Maize Production Technology using var. NMH-1247	Tuensang
20	Performance of Soybean Variety JS 95-60 under Tuensang	Tuensang
21	Performance evaluation of tomato var. Kashi Amrit and Swarna Sampada	Wokha
22	Promotion of High Yielding Paddy Variety RC Maniphou-10 in Mid Altitude Hill Ecosystem	Ri-Bhoi
23	Paddy Cum Fish Farming in Ri-Bhoi District of Meghalaya	Ri-Bhoi
24	Nutrient supplementation and deworming practices on growth and reproduction performance of Hampshire crossbred pigs	Chandel
25	Feeding management of broiler White Pekin duck	Imphal West
26	Feeding of home-made ration to cross-bred pigs	Tamenlong
27	Vanaraja poultry for increasing farmers' income	Longleng
28	Low cost feeding racks for goats	Khowai
29	Popularization of duck breeds for egg purpose in Wokha district of Nagaland	Wokha
30	Controlled Breeding of Common carp to intensify seed production	East Khasi

Feeding management of broiler White Pekin duck

Introduction

Duck rearing for egg or meat is commonly practised by the local farmers in backyard poultry farming system. But, due to high cost of feed scarcity of conventional feed ingredients, duck rearing becomes cumbersome. Therefore, intensive and continuous efforts are being made to reduce the cost of production without jeopardising the profitability of duck production by replacing the costly ingredients in duck ration.

In spite of tremendous scope available for duck rearing in the specified pockets and high demand of duck meat, this enterprise is not massively undertaken by the local farmers, mainly because of un-availability of safe water pools throughout the year, high cost of standard commercial ration, and the high mortality during growing period. Looking into these constraints, an OFT on “Feeding management of broiler white Perkin Duck” under the semi-range system with swimming facility at 3 levels of feed composition in the diet was conducted across 3 locations of Imphal West.

Source of the Technology with year of release

Directorate of Poultry Research, Hyderabad, 2010

Table: Feeding management of broiler White Pekin duck

Treatment		Average body wt. (Kg) at 12 wk	Feed conversion ratio(kg of feed /kg body weight gain	Feeding cost (30 duck) (Rs)	Gross Cost	Gross return (Rs)	Net return (Rs)	B.C. Ratio
T1	Standard Conc. Mixture 30% + Rice Bran 50% + egg shell, green grass, snails 20%	3.41	3.5	9240	12240	25575	13335	2.08
T2	Standard Conc. Mixture 15% + Rice Bran 65% + egg shell , green grass, snails 20%	2.5	2.75	6720	12240	18750	6510	1.53

Outcome and impact

The average body weight of 3.41kg was recorded at 12th week with 14.01 kg of feed having 30% standard concentrated mixture + 50% rice bran + 20% of egg shell and green grass.

Maximum gain in body weight of 3.41 kg was attained with minimum feed conversion ratio of 3.01 with better weekly growth rate. Percent eviscerated weight at 12 weeks of age was highest in ducks fed with the same treatment.

Standard Conc. Mixture 30% + Rice Bran 50% + egg shell, green grass, snails 20% (T1)was therefore, recommended as the profit per duck was Rs.647.00 with highest net returns having the B:C ratio of 2.08.

White Pekin duck unit at Mayang Imphal and Sekmai villages

With this intervention, meat production was enhanced by 75 to 80 percent in the villages. The annual net return was also enhanced at 50 per cent per unit in comparison to local practice and thereby, providing employment generation of 158 man-days per family.

Use of *Trichoderma viridae* for controlling *Rhizoctonia* rot in pea in East Khasi hills

Garden pea is one of the vegetable crops cultivated in large scale in the district, but due to the high incidence of pests and diseases the yield and the return of the crop is very poor. Among the diseases, *Rhizoctinia* rot of pea was found to be the major disease faced by the farmers. It was observed that the farmers in the selected villages were not following any management practices for controlling the diseases in their field which resulted in high mortality percentage. Therefore, an OFT on use of *Trichodermaviridae* for management of *Rhizoctinia* rot in pea was conducted in 3 locations of East Khasi hills. The pea seeds were treated with Trichoderma @ 5-10 g /kg of seeds before

sowing the seeds, soil treatment @ 6-8 Kg/ha of land and foliar application @ 5-10 kg/l of water at the early stage of the crop.

Source of the Technology with year of release

State Biological Control Laboratory, Upper Shillong, 2008

Outcome and impact

The result revealed that the use of bio agents in pea recorded a higher yield of 6.5 q/ha with a net return of Rs.1,31,649 as compared to control with an average yield of only 3.0 t/ ha and a net return of Rs.69,895. The B:C ratio was also found to be higher (3.1) in treatment with *Trichoderma viridae* compared to control (2.3).

Table: Performance of *Trichoderma viridae* for controlling *Rhizoctonia* rot in pea

Treatment	Yield kg/ha	Net return (Rs./ha)	Disease incidence (%)	B:C Ratio
Farmer's Practice: No managemen	3,000 kg /ha	Rs.69,895	17.5%	2.3
Treatment: seed treatment @ 5-10 g /kg of seeds before sowing the seeds, soil treatment @ 6-8 Kg/ha of land and foliar application @ 5-10 kg/l of water at the early stage of the crop	6,500 kg /ha	Rs.1,31,649	3.5 %	3.1

OFT of pea in farmers' field

The use of *Trichodermaviridae* to control *Rhizoctinia* rot of pea has led to a reduction in disease incidence. The results show that only 3-4% of the disease incidence has been reported whereas upto 30% of the disease incidence has been identified in control. The result also shows that there has been an increase in yield of about 41.5% in the demonstrated field over the local check. The farmers expressed that they have a keen interest in adopting this technology and are willing to replace the use of

chemical pesticides with the use of *Trichoderma*since it is safe, eco-friendly and compatible to use with other bio fertilizers, compost and FYM.

Use of Pusa Hydrogel for management of moisture stress in direct seeded Onion

Introduction

The rice fallow lands offer a great scope to grow vegetable crops during rabi season and some of the farmers of West Garo hills of Meghalaya utilize their rice fallows for cultivation of onion. Onion being a shallow rooted crop its yield is affected significantly by temperature and moisture content of soil during seedling, vegetative growth and bulb development. **T**he farmers need to give 25- 30 nos. of irrigation, but due to limited availability of irrigation water they usually face problem and have to arrange water from external sources. The problem of moisture stress during the bulb formation stage reduces the yield which is the main problem ingrowing onion in West Garo hills of Meghalaya. To get rid of this problem, application of polymer based bio-degradable gel is an answer to meet the water requirement at the time of urgent necessity. Looking into its effectiveness, KVK, West Garo hills conducted an OFT on “Use of Pusa Hydrogel for management of moisture stress in direct seeded Onion”.

Pusa Hydrogel is an environmental friendly and semi- synthetic super absorbent polymer developed by Indian Agriculture Research Institute, New Delhi. It is in granular form and is used with various crops for the saving of water. The application of Pusa Hydrogel in soil reduces the moisture stress to the crop. It acts like a sponge and it absorbs irrigation water and releases it slowly to the plants depending on suction pressure of the root system. So, crops in the field get sustained supply of moisture for growth. When it absorbs water, it swells/ expands; when it releases moisture it shrinks. Water absorbed Pusa Hydrogel is released as useable moisture in the root zone. Thus, it keeps the soil moist and loose by repeatedly, expanding and contracting. It will slowly degrade in the soil into harmless soil matter over time.

Pusa Hydrogel was applied as basal @ 1-1.5 kg per acre at the time of final ploughing just below the soil surface (1 to 4 inches) mixed with fertilizer. It reduces the irrigation frequency required supplying moisture in the root zone.

Source of technology and year of release

IARI, New Delhi, 2012

Outcome and impact

Application of Pusa Hydrogel for effective management of moisture stress in onion has revealed that the farmers got the highest pay back net return of Rs.3,09,540/ ha with good benefit cost- ratio of 3.56 and higher yield as compared to the local farmers practice as shown in Table No. 1. In Selsella block of West Garo hills district where an area of 0.5 ha of land was demonstrated, an increase in yield attributes of onion viz. girth of the bulb (4.12 cm), weight of the bulb (102g) and yield (215q/ha) were observed. In Garo Hills, the farmers usually apply 25 numbers of irrigation in cultivation of direct seeded onion, but after incorporation of pusa hydrogel in the soil and fertilizer, a reduction in frequency of irrigation was observed during the cropping season.

Table 1: Effect of application of pusa hydrogel in yield attributes and yields of direct seeded onion

Parameters on assessment	Technology	Farmers practice
Days to harvest	140	145
No. of irrigations	10	25
Girth of bulb (cm)	4.12	3.60
Weight of bulb (g)	102	81
Yield(q /ha)	215	182
Net income (Rs./ha)	3,09,540/-	2,45,550/-
B:C ratio	3.56	3.07

Use of scientific knowledge in a sustainable way in onion cultivation has spread over a larger area leading to higher productivity, efficient utilization of soil moisture, food security and increased income to farmers. The application of Pusa Hydrogel helped the farmers to reduce the number of irrigations given in onion crop which in turn helped in improving the economy of the farmers. The positive attribute of applying the gel helped in dissemination of technology in and around the villages in paddy fallow areas of Garo Hills, Meghalaya. The farmers of the district had encouraged the fellow farmers to utilize fallow lands for cultivation of vegetables during Rabi season for livelihood security and income generation.

Rejuvenation of Citrus orchard

Introduction

Lunglei District has a wide range of climatic condition, moderate in summer and not very cold in winter with adequate amount of rainfall. Thus, most of the crops are grown mostly under rain fed condition and a large number of horticulture crops such as fruits, vegetables, flower, spices and condiments, plantation etc are grown in different regions of the district. Among fruit crops, Mandarin (*Citrus reticulate* Blanco*)* is one of the most important commercial fruit crops grown in the district and it occupies maximum area amongst fruit crops in the District. The citrus orchards are very old and unproductive; in order to improve the quality and yield potential rejuvenation of old and unproductive orchard is the best way for improving the economic yield. Looking into the importance of the issue, an OFT was conducted with the following treatments to rejuvenate the declined orchards in three locations.

1) Cutting and pruning of water sprout, diseases/dried twigs and making of half-moon terrace/tree basin for placement of manure and fertilizers was done in the month of Dec-Jan.

2) Application of slaked lime@3kg/tree and 30kg FYM/tree/year in the month of Feb-March.

3) Application of 650g Urea+1220g SSP+450g MOP/tree three times in a year in the month of April- May, June-July and Oct-Nov.

4) Application of Bordeaux paste/Blitox-50 on tree trunk and spray of Bavistin (1g/L)+Monocrotophos (1 ml/L) on new flushes and Spray of Micronutrient on new flushes in the month of April.

5) Pasting of tree trunk with 1% Carbaryl 50 WP(20g/L) and collection and destruction of Citrus trunk borer in the month of May.

6) Spraying of Bavistin(1 g/L) + Monocrotophos(1 ml/L) on new flushes and after 15 days, spray with Bordeaux mixture (1%) or Blitox-50 (3 g/L).Spraying of Micronutrient on new flushes in the month of June-July and August-September.

7) Application of Bordeaux paste/Blitox-50 on tree trunk upto 60 cm height from ground level and to kill Trunk borer grubs, clean the bored holes of the infested trunk and insert a cotton swab soaked in petrol/Dichlorvos or inject 5ml of Dichlorvos @ 0.2% (2ml/L)and plug with mud in the month of Aug-Sept.

8) Spraying of Malathion @2 ml/L to prevent fruit fly egg laying in the month of Oct-Nov.

9) Mulching, moisture conservation and irrigation during dry season.

10) Weeding at regular interval.

Source of the technology and year of release

ICAR Research Complex for NEH Region, AP Centre, Basar, 2008

Outcome and impact

The average yield of rejuvenated orchard was 125 q/ha with the average net returns of Rs.2, 20,000 in the district while the average yields of declined orchard was only 43.75 q/ha with the average net return of Rs.2.20 lakhs/ ha. The technology intervention is simple, practicable and easily adopted by 70% of Citrus growers which resulted in increased production. The technology intervention has provided an economic benefit to the farmers with a B:C ratio of 3.2 as compared to the control (2.1). The technology hasbeen popularized through FLD in the district and many of the farmers have adopted this technology.

Table 1: Mandarin yield of rejuvenated orchards

Sl.No	Parameters	Technology demonstrated	Farmer's practice
1.	Average Fruit weight (gm)	142.85	130.48
2.	Average no. of fruit/plant (nos)	250.12	100
3.	Yield (q/ ha)	125	43.75
4.	Net return (Rs/ ha)	220000.00	55000.00
5.	B:C ratio	3.2	2.1

Rejuvenated orchards at Hnahthial, Thiltlang and Muallianpui villages

Improved Maize Production Technology

Introduction

Rice is considered as staple food for the farmers of Tuensang district and Maize is considered indispensable crop as Maize grains are sold to buy rice. Maize crop being nutrient exhaustive crop usually performs well in current *Jhum* field compared to second year fallow and this usually pushes the farmers to grow only in the first year of *Jhum*. The local cultivars have better yield potential with long duration (up to 8 months) resulting increased cost of cultivation per unit area per season and there by delays rabi crops production with lower cropping intensity per year.

Reducing the cost of cultivation per unit area, shortening the crop duration by replacing with shorter duration high yielding crop varieties and increasing the cropping density could be the best probable solution based on the present system of cultivation. Keeping the identified problems in focus and to introduce shorter duration high yielding varieties with higher yield potential, an **On Farm Trail** was conducted on 'Improved Maize production technology using improved variety NMH-1247 (Dragon).

Performance of NMH-1247 during 2016 in farmers' field (under OFT)

Source of technology and year of release

ICAR-Indian Institute of Maize Research, Ludhiana, 2015

Outcome and impact

The technology under OFT performed very well with average yield of 7.26 t/ha with 53.48% increase in yield over the local check with the B: C ratio of 2.52 in the first year.

Based on performance, NMH-1247 was recommended for production in high altitude during Kharif season under early sowing during Rabi over its recommended sowing date in un-irrigated condition semi temperate type of climate (1200msl and above) to avoid moisture stress in hills under Tuensang situation.

Table: Performance of NMH-1247 over the local varieties

Treatment	No of cobs/ plant	Yield kg/ha	Net return (Rs./ha)	B:C Ratio
Improved cultivation practices + Improved maize Var: NMH-1247 (**Kharif Season**)	1	7,260	35,080/-	2.52
Local cultivar	1	4,730	19,400/-	2.05
Improved cultivation practices + Improved maize Var: NMH-1247 (**Rabi Season**)	1	3,140	30,600/-	2.85
Average Yield in the district (Both Kharif and Rabi season)	1	5200	-	-

NMH-1247 (Dragon) in the farmer's field, Chendang village 2018

Frontline Demonstration during 2017

The performance of the technology in the demonstration area outperformed the locally cultivated cultivar with an average yield of 49.50 q/ha against an average yield of 38.67 q/ha. The increase in yield of the technology (NMH-1247) was 28.05% with 1.90 B: C ratio and a net return of Rs. 20270/- per hectare in the first cropping season. The new variety also reduced incidence of logging as it is shorter in height.

The duration of NMH-1247 is shorter with 4-5 months in comparison to local cultivars which is 8-9 months making it possible for farmers to opt for sequential cropping. In the same cropping year Soybean, Var. JS 9305 was taken as double crop after NMH-1247. The yield from the succeeding crop (Soybean) was 22.10q/ha bringing an additional net return of Rs. 11573/-

With the success of the technology under OFT, large scale frontline demonstration was initiated in the succeeding year (2017) in Chendang village involving 10 numbers of farmers in five different locations covering an area of 5 hectare.

In the current year (2018), 1500 kg of NMH-1247 has been supplied to the farmers covering more than 100 hectares in 15 villages of the district. The anticipation of increasing the Maize production per hectare in the district is evident which is expected to enhance the income of the farmers in the district. This technology intervention can be viewed as one solution towards fulfilling the very vision of doubling the Farmers' income by 2022.

Single Bud Transplanting Technique of Ginger & Turmeric to Reduce Seed Cost

Introduction

Due to high seed requirement (15-20 q/ha) of ginger and turmeric the cost of production increases rapidly. Around 40-45% of total cost of cultivation is incurred for procurement of seed in these crops and this is one of the major constraints for large scale cultivation of these two crops. Considering this constraint, a single bud cutting technology developed by ICAR- Indian Institute of Spices Research, Kozhikode, Kerala was tested by KVK Ri-Bhoi during 2017-19 in two villages' viz., Umeit and Khodongulu covering one hectare area in 18 farmers' field each year in the district of Meghalaya. In this technology, the disease free seed rhizomes of ginger (variety Nadia) and turmeric (variety Megha turmeric 1) were cut into small pieces of 5-6 gm containing a single bud. These buds were treated with *Trichoderma viridae* @ 2g/litre, sown in pro-trays using suitable growing media prepared by mixing sand: soil: FYM @ 1:1:1 in the month of March and pro-trays were kept under polyhouse covering with straw/ dry weed mulches to protect the same from wind and heavy rain. Lifesaving watering was done as and when required. After 30-40 days, the germinated and well developed seedlings were transplanted in main field in the month of April –May with mulching to enhance survivability in the main field by maintaining a spacing of 25 cm x 30 cm.

Source of Technology

ICAR-Indian Institute of Spices Research, 2014

Outcome and impact

The data in Table 1 revealed that the single bud transplanting technique of ginger and turmeric produced healthy crop with faster growing with higher yield (235.5 q/ha in ginger and 287.6 q/ha) within shorter period and eventually reduced the cost of cultivation by 54.97 and 50.6 per cent in ginger and turmeric, respectively.The farmers are happy with the single bud transplanting technique of ginger and turmeric due to reduced cost of production.

Table.1 Comparison of single bud rhizome transplanting and conventional planting of ginger and turmeric

Parameter	**Single bud rhizome (5-6 g) transplanting @ 5-6q/ha**		**Conventional planting method @15-20q/ha**	
	Ginger	**Turmeric**	**Ginger**	**Turmeric**
Survivability (%)	90	92	100	100
Sprouting (days)	18-20DAP	15-18DAP	20DAP.	20DAP.
Tillering(days)	2 MAP	1½ – 2 MAP	3 MAP	3 MAP
Rhizome development(days)	Starts from 3 ½ MAP	Starts from 3 MAP	Starts from 5 MAP	Starts from 5 MAP
Rhizome maturation(days)	6½-7 MAP	6-7 MAP	7½-9 MAP	7-9 MAP
Yield (q/ha)	235.45	287.6	200.55	202.3
Cost (Rs/ha)	65611	53946	145713	109105
Net Return (Rs/ha)	377677	371542	21717	172645
B:C ratio	5.41	5.43	2.47	2.59
Cost saving (%)	54.97	50.6	-	-

Single bud transplanting technique of ginger and turmeric

Integrated Paddy cum Fish Farming in Ri-Bhoi District of Meghalaya

Introduction

Mono-cropping of paddy in low land valley ecosystem with low system productivity and income from single enterprise with 35 per cent severity are major bottleneck in Ri-Bhoi district of Meghalaya. Paddy-fish integrated farming system complement each other with utilization of different ecological niches and function together which last for 6-8 months depending upon availability of water. Fish lives in between the dense paddy which helps as a hideout against birds, in return fish provides fertilizer with their droppings, eat insect pests and help to circulate oxygen around the paddy field resulting in paddy yield enhancement. Realizing the importance of paddy-fish farming the technology was standardized by Division of Fisheries, ICAR Research Complex, Umiam as to enhance the farm income of the farmers. KVK Ri-Bhoi undertook OFT at three different villages viz., Kyrdem and Umsawriang covering one hectare area in five different farmers' field during 2018-19 to enhance the system productivity and income of farming community in the district. Modifications in the paddy field were done by digging canals or trenches in various forms at least 0.5 - 0.6 m deep and 1 m wide which serve as refuge for fishes. The dykes was elevated with gentle slope which can retain or withstand if water level rises and installed with inlet and outlet protected with fine screening. Depending on the location, fencing with netting material used to prevent fish from escaping during heavy rains. Transplantation of paddy was done when the field was ready. After two weeks of transplantation, fingerlings of Amur common carp (main species), catla, rohu, mrigal, silver carp, grass carp, gonius with stocked @ 6000-7500 Numbers / ha of paddy area were released. The fish fed minimally with rice bran and mustard oil cake in the ratio of 1:1 if needed. Paddy and fish harvested at the same time or depending on the availability of water.

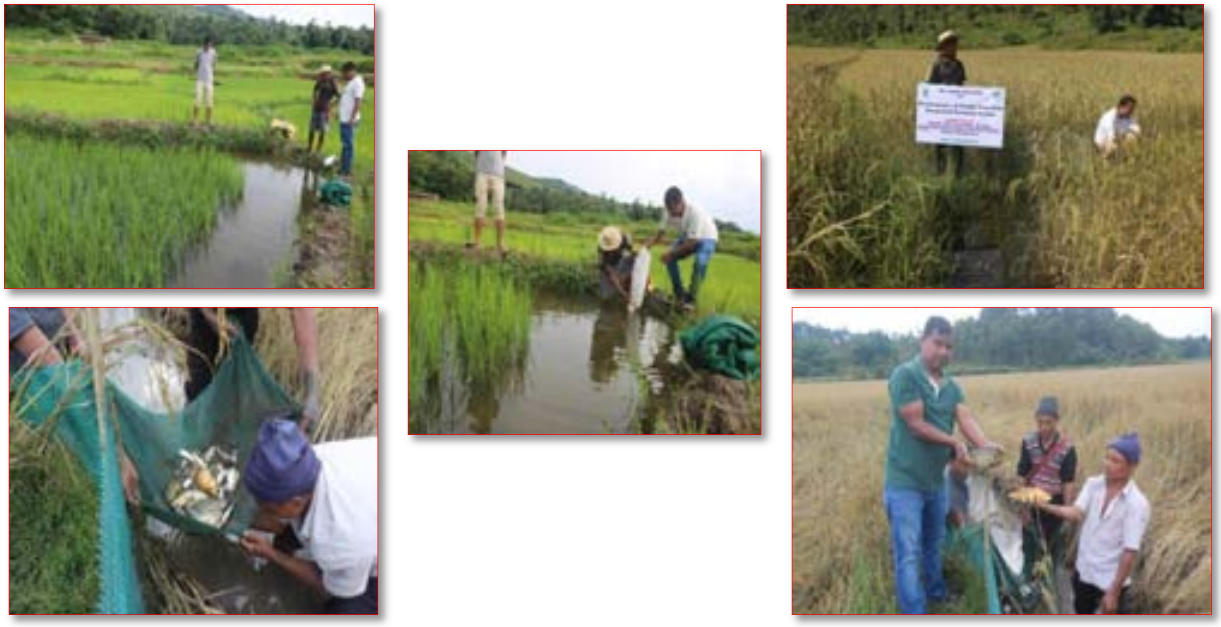
Source of Technology

ICAR Research Complex for NEH Region, Umiam, 2013

Outcome and impact

The result revealed that the paddy cum fish integrated farming system produced 63.33 q/ha as compared to monocropping of paddy yield with 15q/ha. The net return fetched was Rs 127550/ha with the integration of paddy and fish with benefit cost ratio of 3.1 as compared to mono-cropping of paddy. The farmers were happy with the integration of fish with paddy as compared with mono-cropping of farming in terms of yield, income and system productivity.

Details of Technology	Yield (q/ha)	Cost (Rs/unit)	Net Return (Rs/ha)	B:C Ratio
Paddy cum Fish Equivalent Yield	63.33	62450	127550	3.1
Monocropping Paddy	15.0	20750	24250	2.16

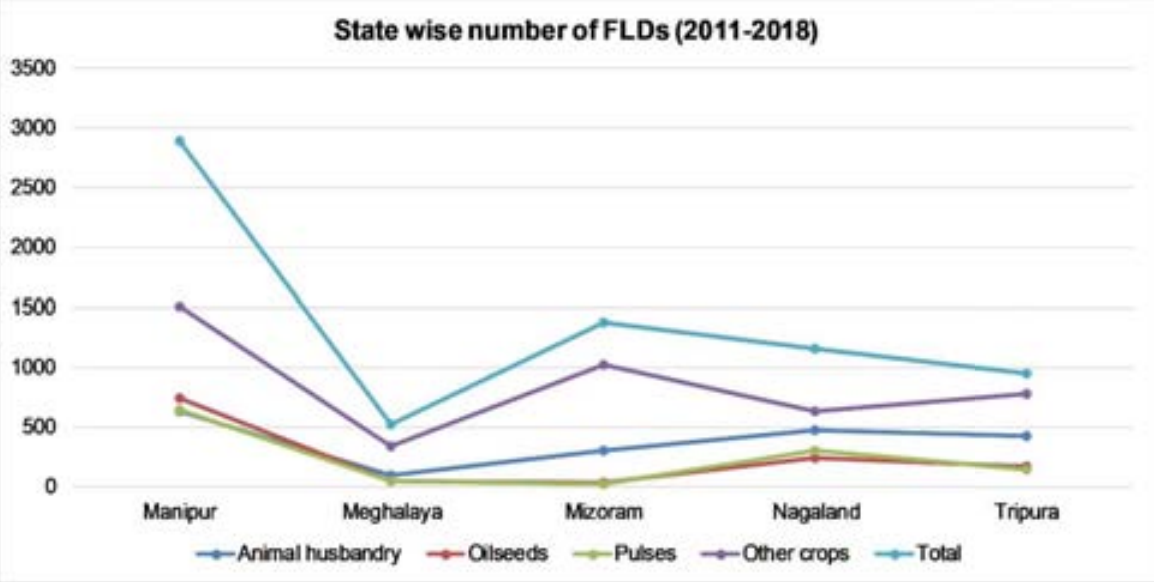


Paddy cum fish integrated farming system

Front Line Demonstrations

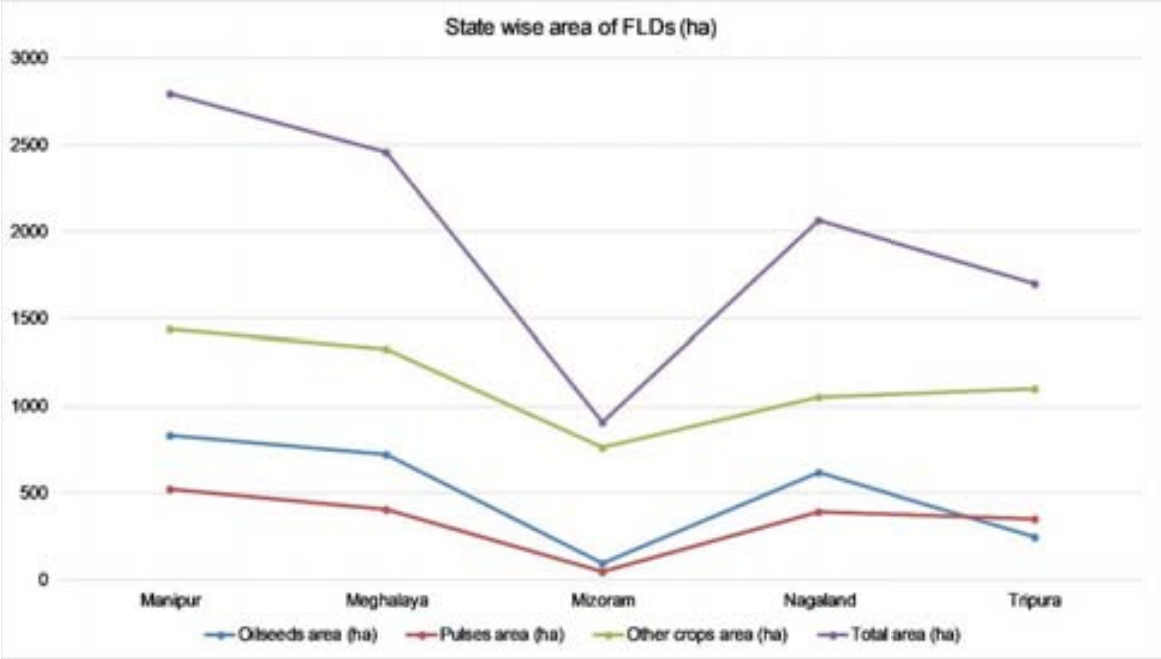
State wise number of FLDs

The data presented in the figure below revealed that the highest no. of FLDs was conducted by Manipur followed by Mizoram, Nagaland, Tripura and Meghalaya during 2011-2018 across different crops and animal sector. Among different sectors, more nos. of FLDs were conducted in cereals & horticultural crops followed by Animal husbandry, pulses and oilseeds.



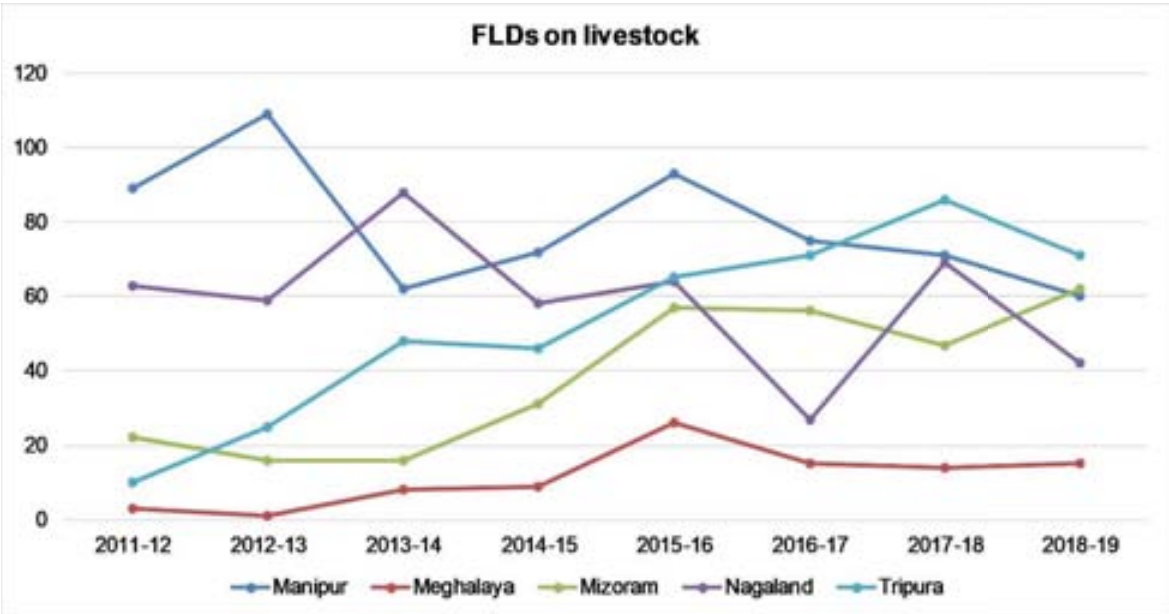
State wise area under FLDs

Graph indicates that the largest area under FLDs was recorded under other crops covering an area of 1441.075 ha in the state of Manipur, followed by Meghalaya, Tripura, Nagaland and Mizoram respectively. The second largest area under FLDs was recorded under oilseed crops covering an area of 835.31 ha in the state of Manipur, followed by Meghalaya, Nagaland, Tripura and Mizoram respectively. Under pulse crops, the largest area was recorded in the state of Manipur covering an area of 521.15 ha followed by Meghalaya, Nagaland, Tripura and Mizoram respectively. Total areas of FLDs was recorded the highest in the state Manipur, followed by Meghalaya, Nagaland, Tripura and Mizoram respectively.



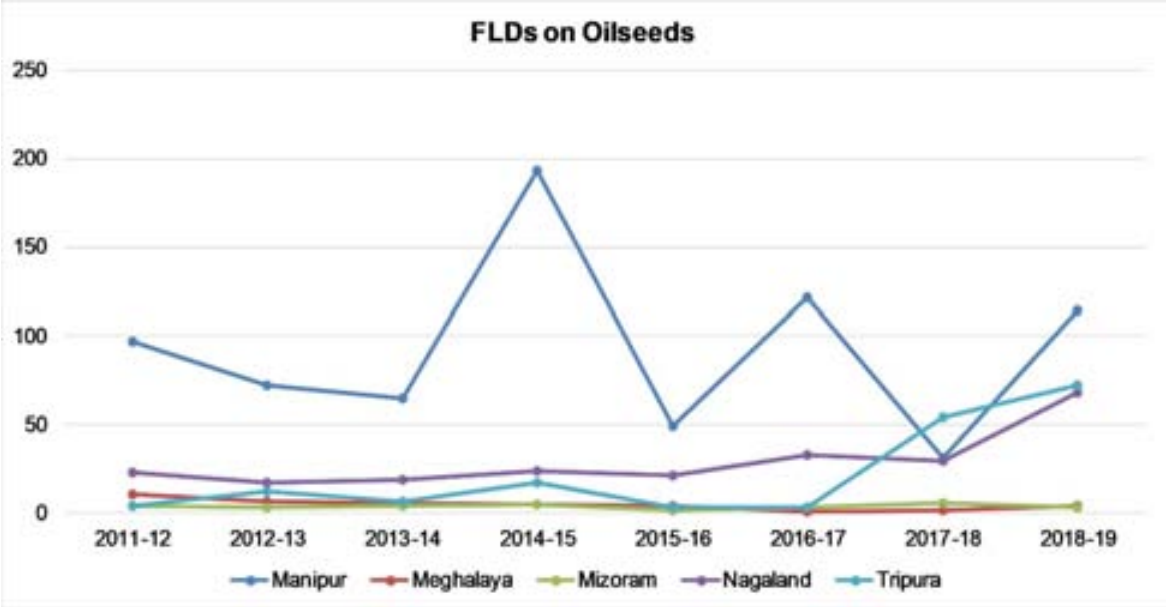
Year wise FLDs on Livestock component

The year wise (2011-2019) data presented in the figure revealed that the highest numbers of FLDs conducted on livestock was recorded in the state of Manipur followed by Nagaland, Tripura and Mizoram while, the lowest numbers of FLDs conducted on livestock was recorded in Meghalaya. The graph however clearly indicates that the number of FLDs was linearly increasing in the state of Tripura.



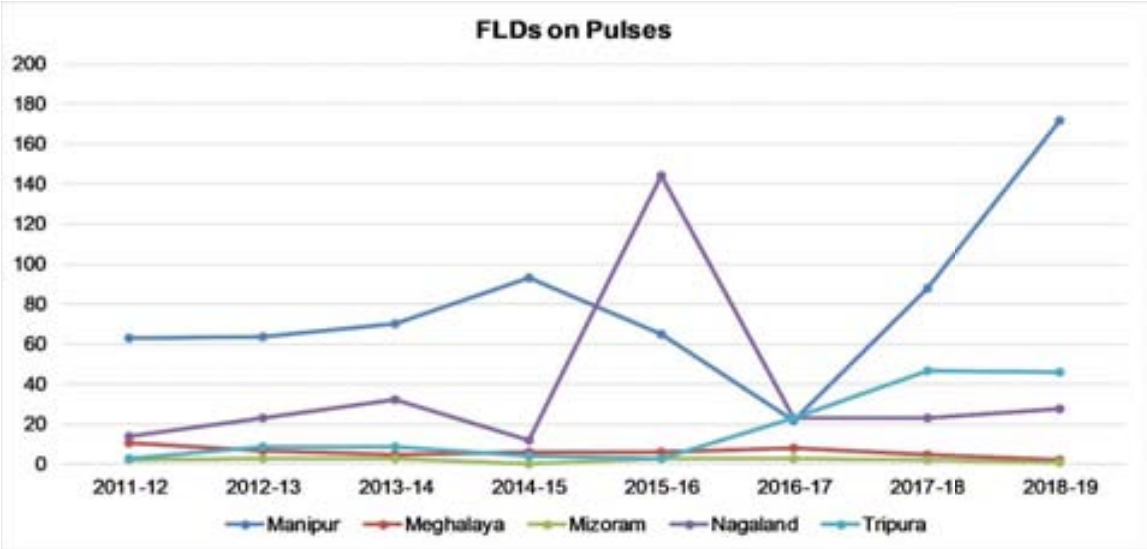
Year wise FLDs on Oilseeds

Year wise (2011-2018) information on FLDs conducted on oilseed crops is presented in the graph below. The year wise data revealed that the highest numbers of FLDs on Oilseeds were recorded in the state of Manipur with743 numbers followed by the state of Nagaland with 235 numbers. However, the lowest number of FLDs on oilseeds was conducted in the state of Meghalaya and Mizoram, respectively.



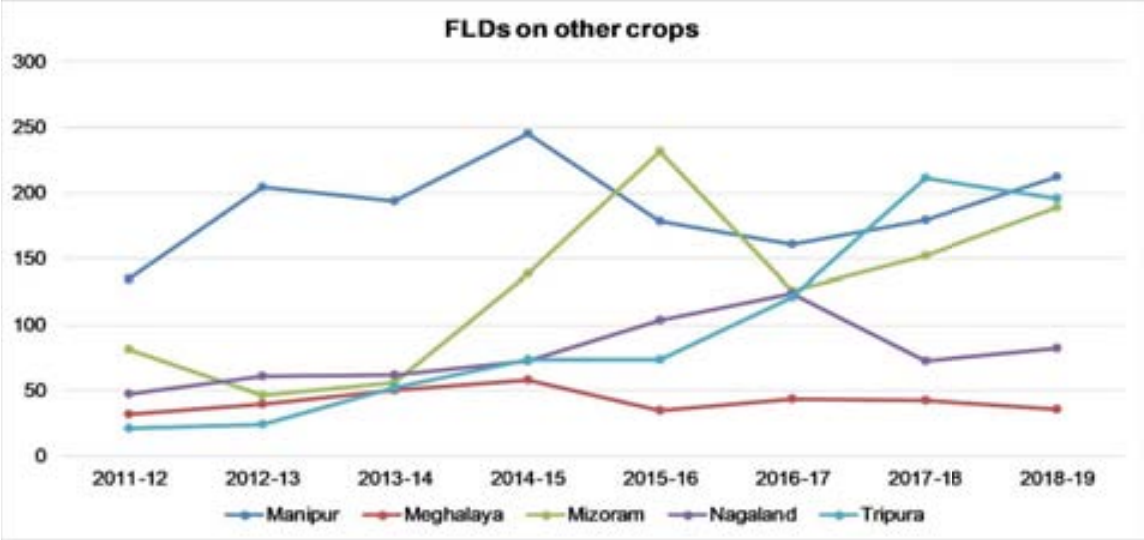
Year wise FLDs on Pulses

The data presented in the figure below indicates that the highest numbers of FLDs on pulses was conducted in the state of Manipur with 637 numbers followed by the state of Nagaland with 299 numbers. In addition, the lowest numbers of FLDs on oilseeds was conducted in the state of Meghalaya and Mizoram, respectively.



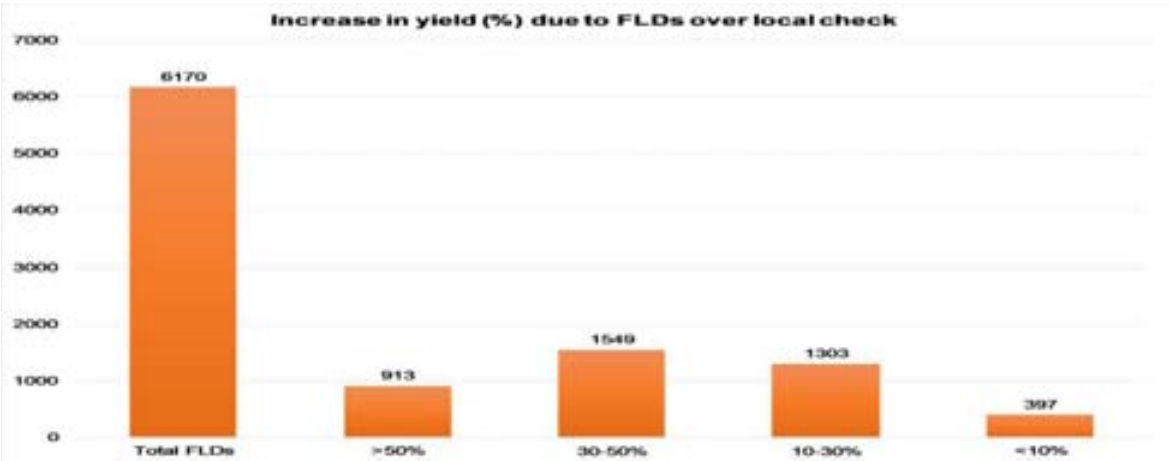
Year wise FLDs on other crops

The year wise data presented in the figure below in respect of FLDs on other crops revealed that the highest numbers of FLDs were conducted in the state of Manipur with 1509 numbers followed by the state of Mizoram with1022 numbers. The lowest no. of FLDs on other crops was conducted in the state of Meghalaya with 338 numbers. In case of Tripura state, an increasing trend is clearly visible while marginal decline is seen in respect to Meghalaya.



Impact of FLDs

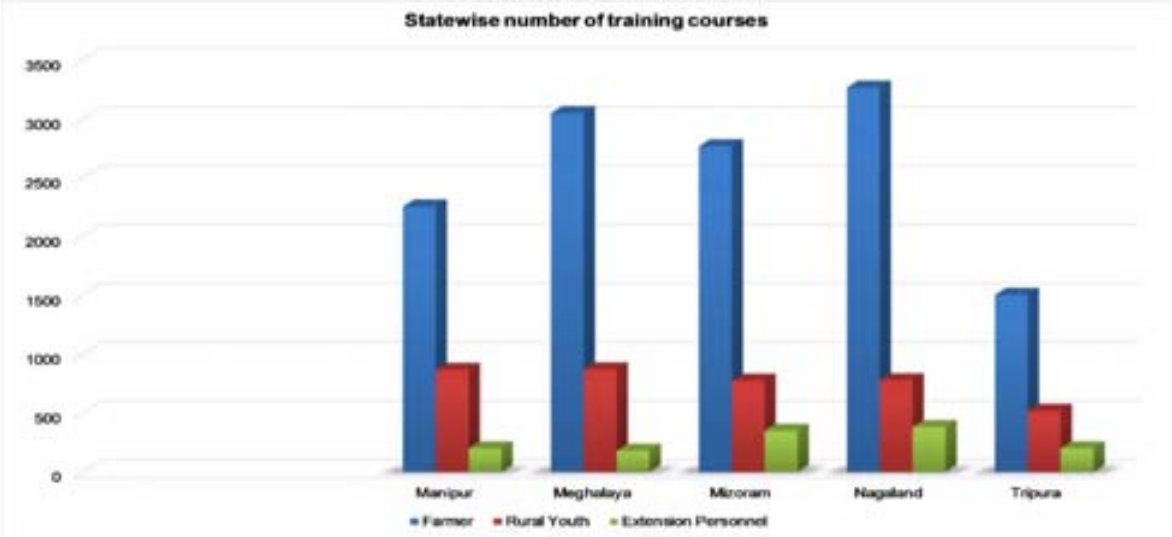
The figure below indicates that there has been an increase in yield (%) due to Front Line Demonstrations across all the KVKs of the region. In 913 nos. of FLDs (14.80% of total FLDs) the yield increase was more than 50% while in 1549 nos. of FLDs (25.11%) the increase in yield was in between 30-50% followed by 10-30 % increase in 1303 number of FLDs (21.12%) over check. However, in 397 cases of FLDs (6.43%) the per cent increase in yield was lesser than 10% over check.



Human Resource Development

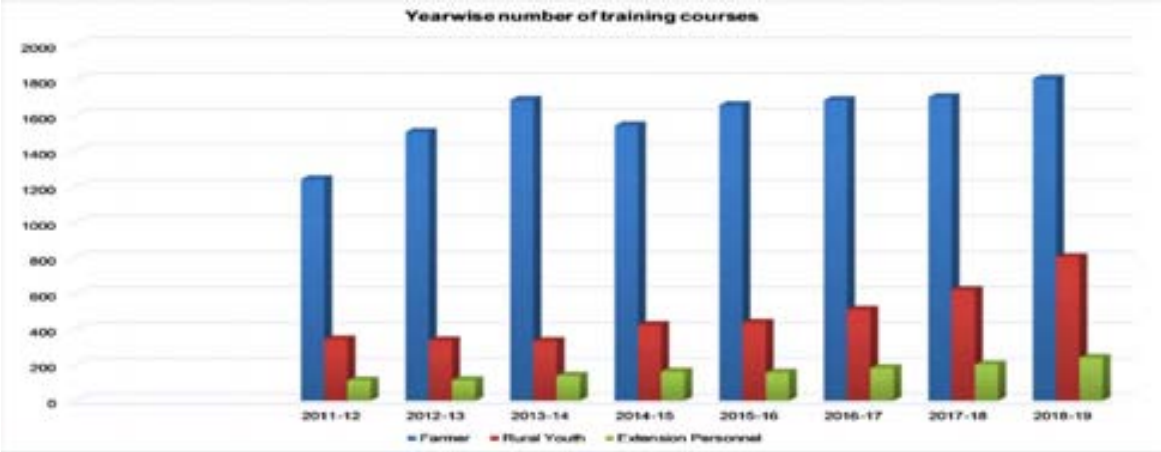
State wise Numbers of training courses

In state wise numbers of training courses, the highest numbers of training courses for farmers were conducted in the state of Nagaland with followed by the state of Meghalaya. The lowest numbers of training courses for farmers were conducted by the state of Tripura. Similarly, maximum number of trainings for rural youth were conducted by Meghalaya followed by Manipur, Mizoram and Nagaland. Moreover, Nagaland conducted maximum number of training courses for extensional professional followed by Mizoram.



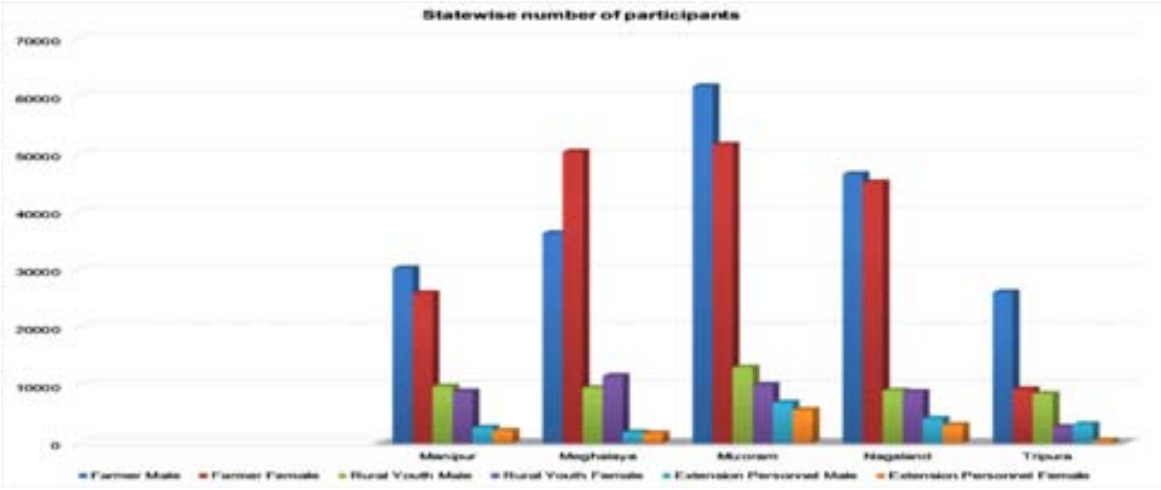
Year wise numbers of training courses

The figure presented below on year wise numbers of training courses conducted by KVKs reveals that the highest numbers of training courses were conducted in the year 2018-19 with 2855 numbers of trainings followed by the year 2017-18 with 2531 numbers of trainings. The lowest numbers of training courses was recorded in the year 2011-12 with 1702 numbers of trainings. It has also been observed that the number of training courses conducted for farmers is in increasing trend in all the categories of stakeholders.



State wise Numbers of participants

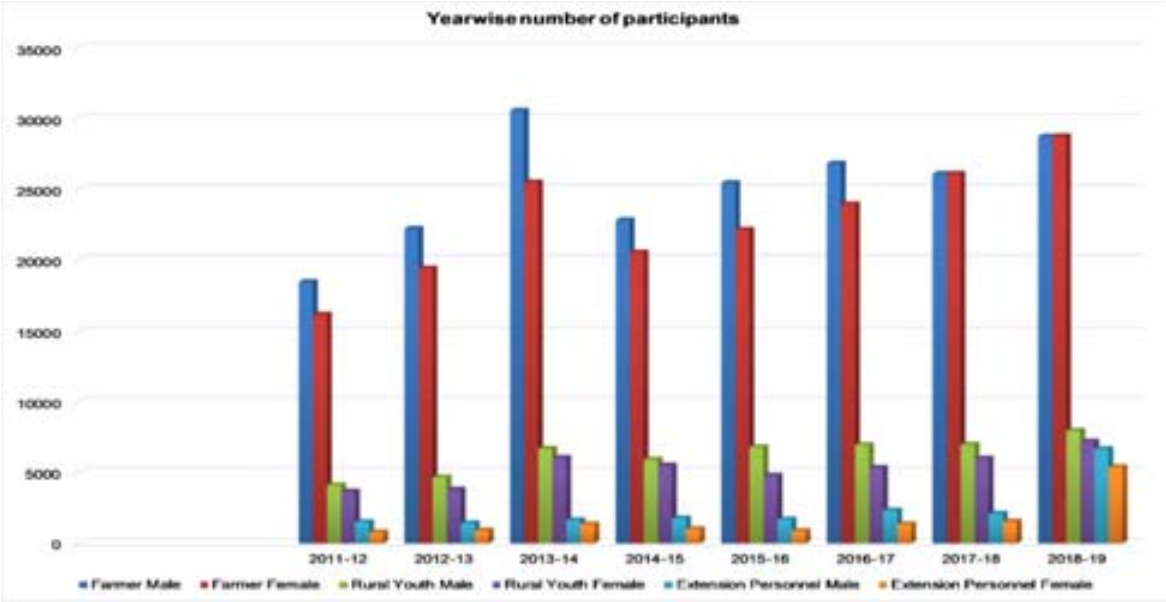
The figure below indicates that the highest numbers of participants took part in various training programmes organized by the KVKs of Mizoram with 61799 farmer male, 51680 farmer female, 13132 rural youth male, 10141 rural youth female, 7037 extension personnel male and 5788 extension personnel female. The lowest number of participants was however, in Tripura with 26143 farmer male, 9367 farmer female, 8567 rural youth male, 2841 rural youth female, 3312 extension personnel male and 477extension personnel female. The figure also indicates that the KVKs of Meghalaya state have trained maximum number of female farmers than that of male farmers whereas, the larger gender gap in trainings is observed in Tripura.



Year wise Numbers of participants

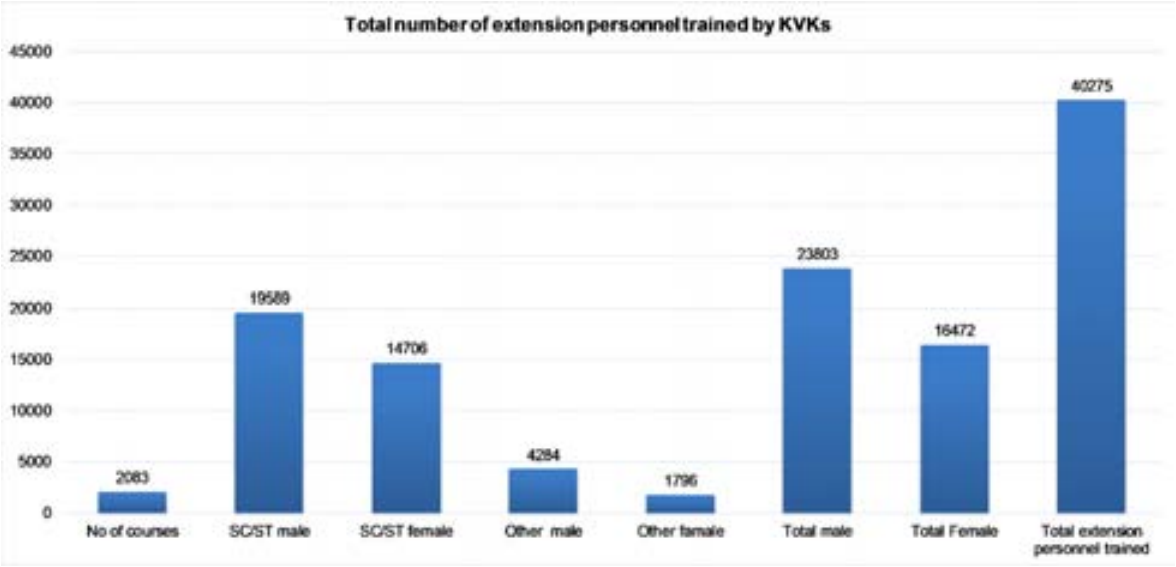
The highest numbers of participants was recorded in the year 2018-19 with 84833 participants in all categories. Similarly the lowest numbers of participants was recorded

in the year 2011-12 with 44789 participants. Maximum numbers of male farmer trainees were recorded in year 2013-14 whereas, maximum number of female farmers participated in year 2018-19. Since 2014-15, an increasing trend of female farmer participation has been observed. In fact, in last two years participation of male and female farmer trainees are almost equal irrespective of states and KVKs.



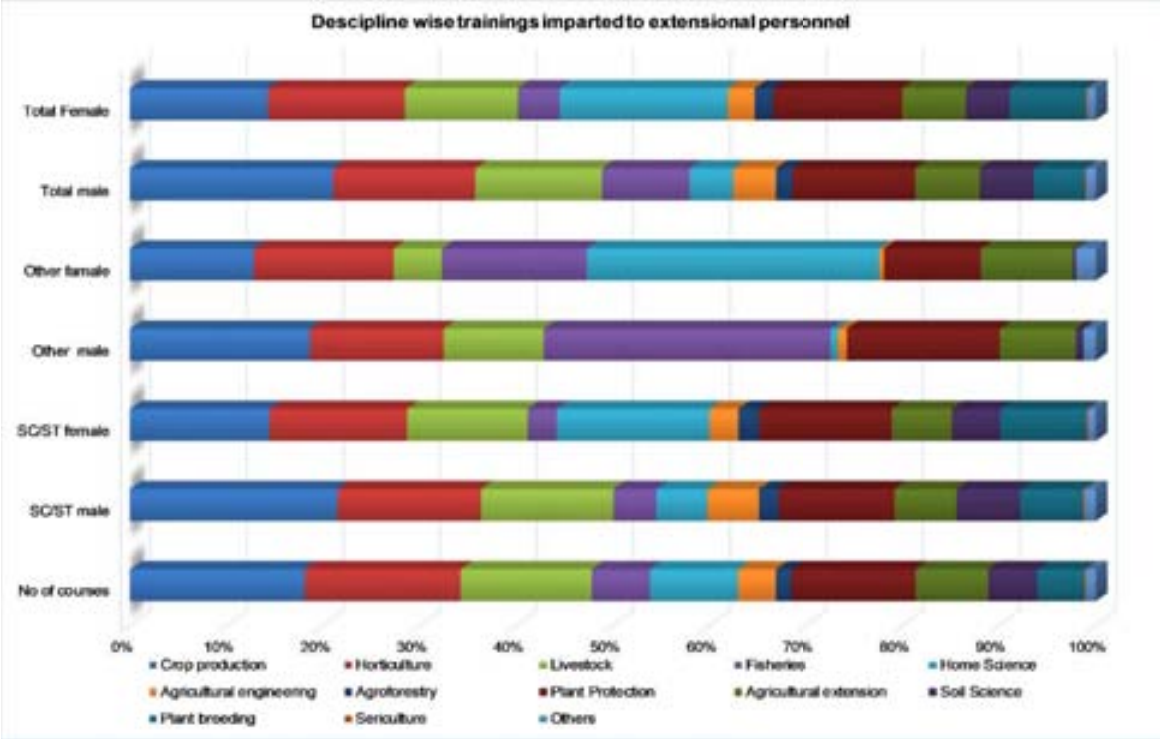
Trainings for extension personnel

During the period of reporting 40275 extension personnel were trained through 2083 training courses by the KVKs. The figure indicated that 23803 male extension personnel and 16472 female extension personnel were trained by KVKs. In all categories male extension personnel dominated the participation in various training courses.

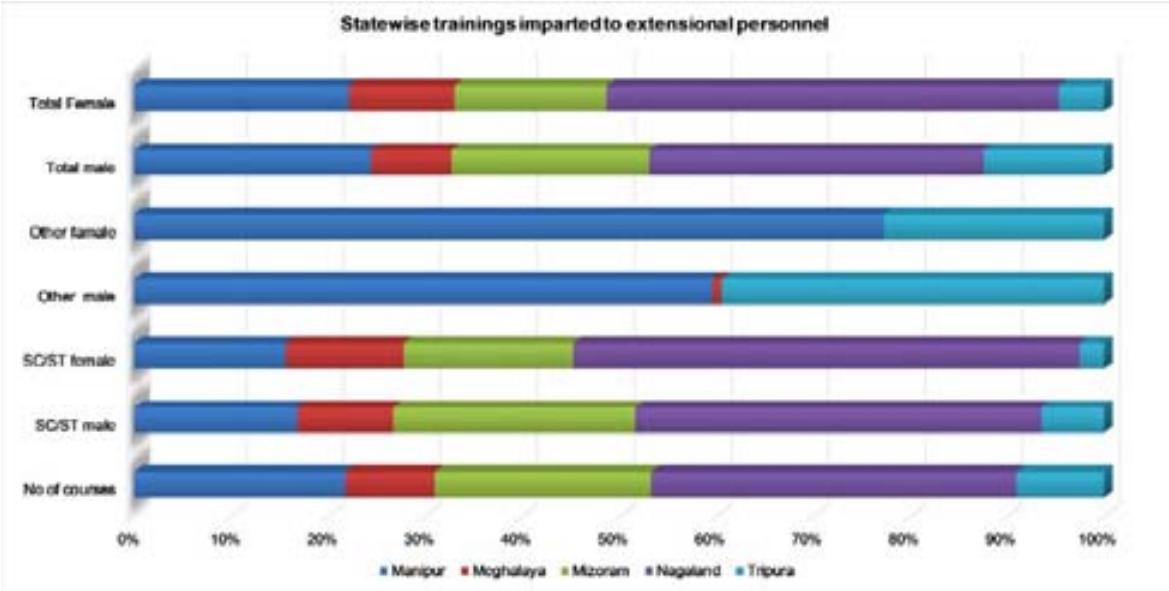


Discipline wise training imparted to extension personnel

Under the discipline wise training imparted to extension personnel, it is evident that maximum number of trainings were imparted in crop production discipline followed by horticulture, livestock, plant protection and agricultural extension. The discipline with the lowest no. of training imparted to extension personnel were soil science, plant breeding, sericulture and others.



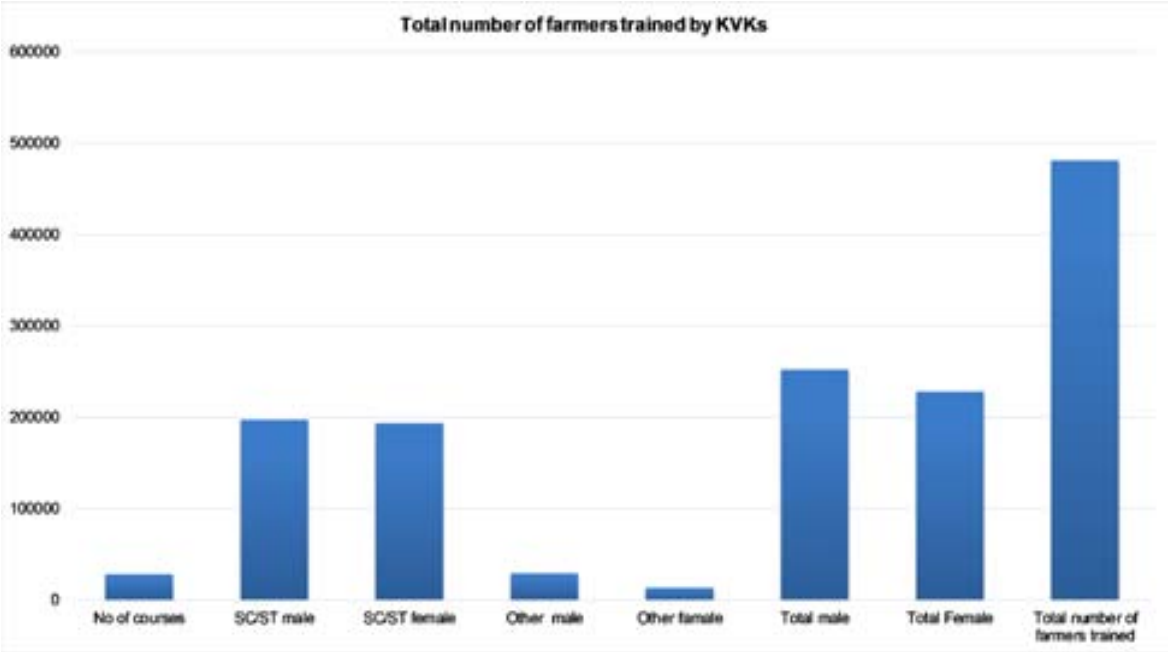
State wise training imparted to extension personnel



In state-wise training imparted to extension personnel as indicated in the figure, maximum number of training courses were organized by Nagaland state, followed by Mizoram and Manipur. Nagaland also trained maximum number of female extension personnel followed by the state of Manipur and Mizoram. The highest numbers of SC/ST male and female extension personnel were trained by Nagaland whereas the other category extension personnel (males & females) were trained by Manipur state.

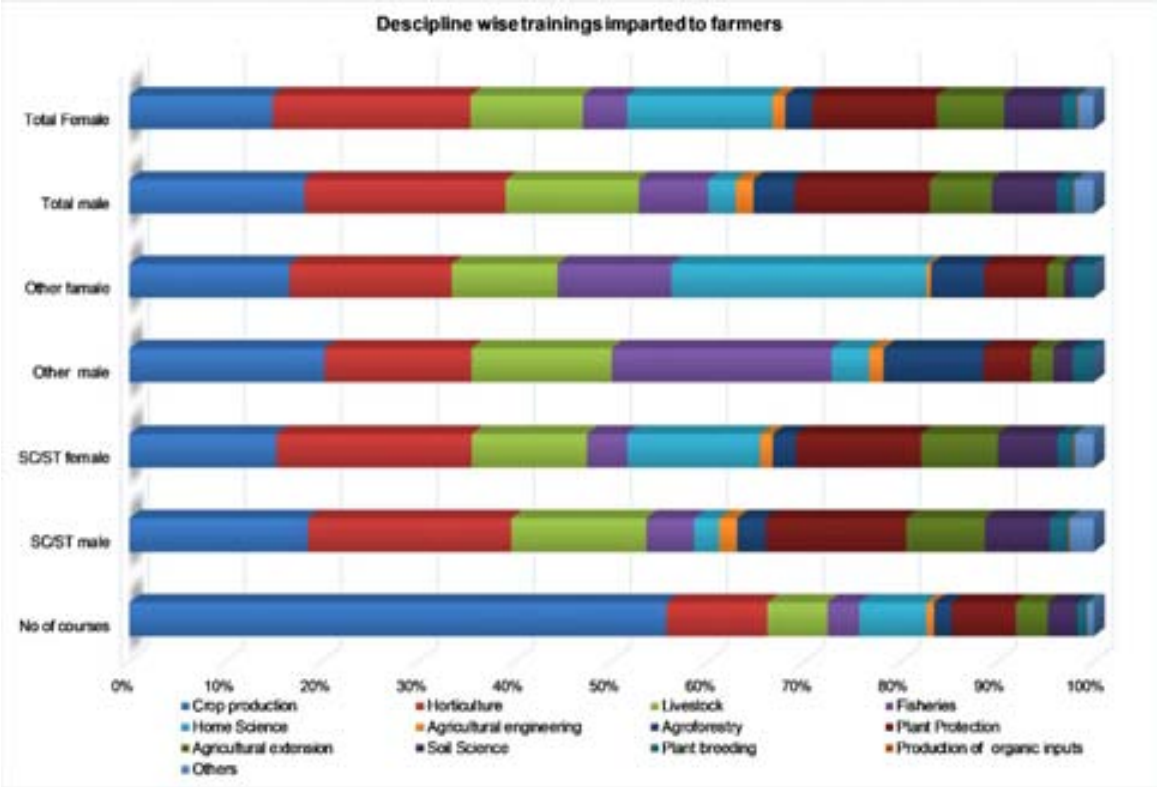
Trainings for farmers

The total numbers of courses conducted by the KVKs for the farmers were 28128 and total of 480830 farmers were trained during 2011-19. According to the corresponding graph 252140 male farmers and 228690 female farmers were trained during the period. The figure also shows that almost equal number of SC / ST male and female farmers were trained by the KVKs.



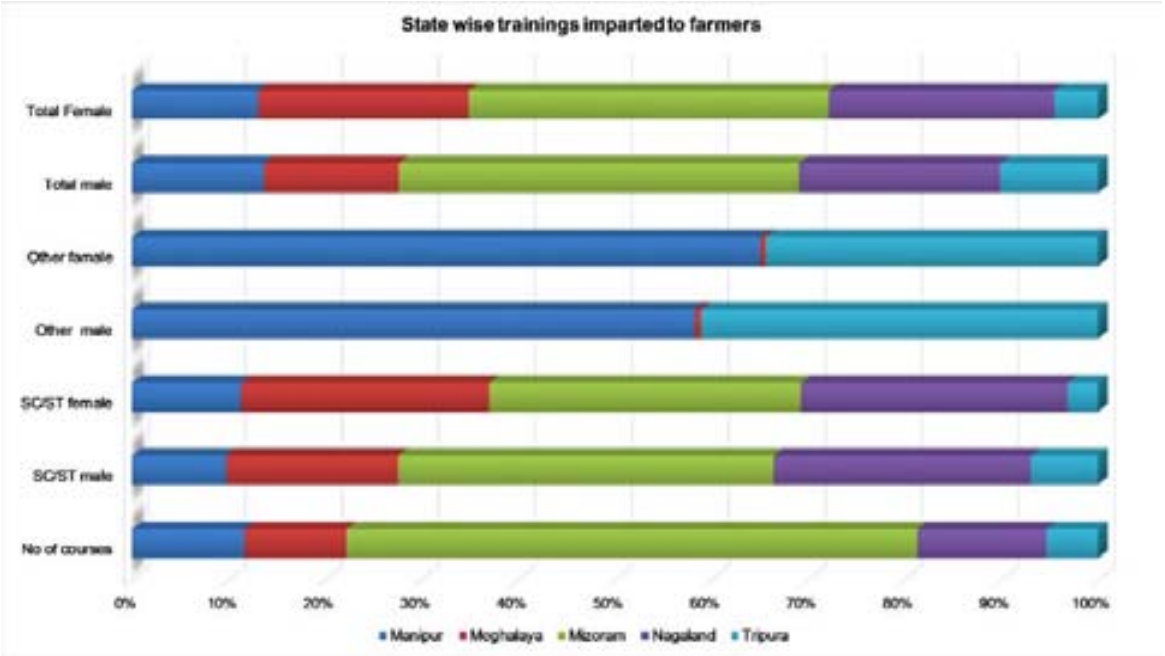
Discipline wise training imparted to farmers

The figure below indicated that the highest numbers of courses were conducted under crop production discipline followed by horticulture, livestock, home science and plant protection. The disciplines with the lowest training imparted to farmers were plant breeding and soil science. Based on interest more nos. of SC/ST males and female farmers were trained in the disciplines of horticulture, crop production and livestock rearing whereas the highest nos. of males belonging to other categories were interested for training in the disciplines like fisheries and other category females participated in large nos. in home science related courses.



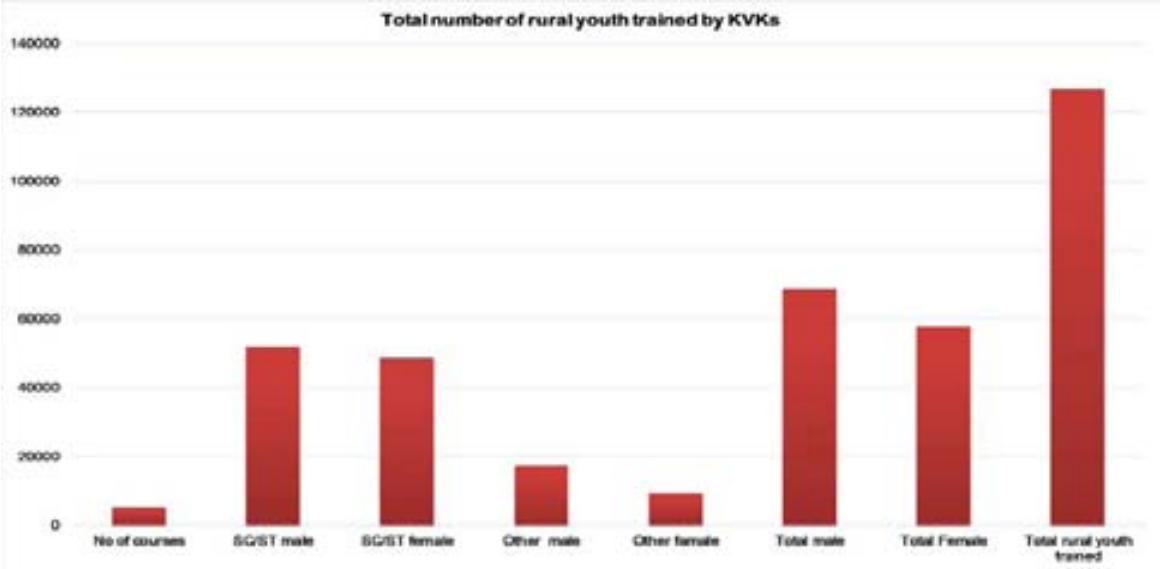
State wise training imparted to farmers

In state-wise trainings imparted to farmers, the highest numbers of training courses (16620) were organized by Mizoram and trained 104421 male and 85235 female farmers during the review period. The highest numbers of SC/ST farmers were trained from Mizoram, Meghalaya and Nagaland whereas the KVKs of Manipur and Tripura trained a large nos. of farmers from other category.



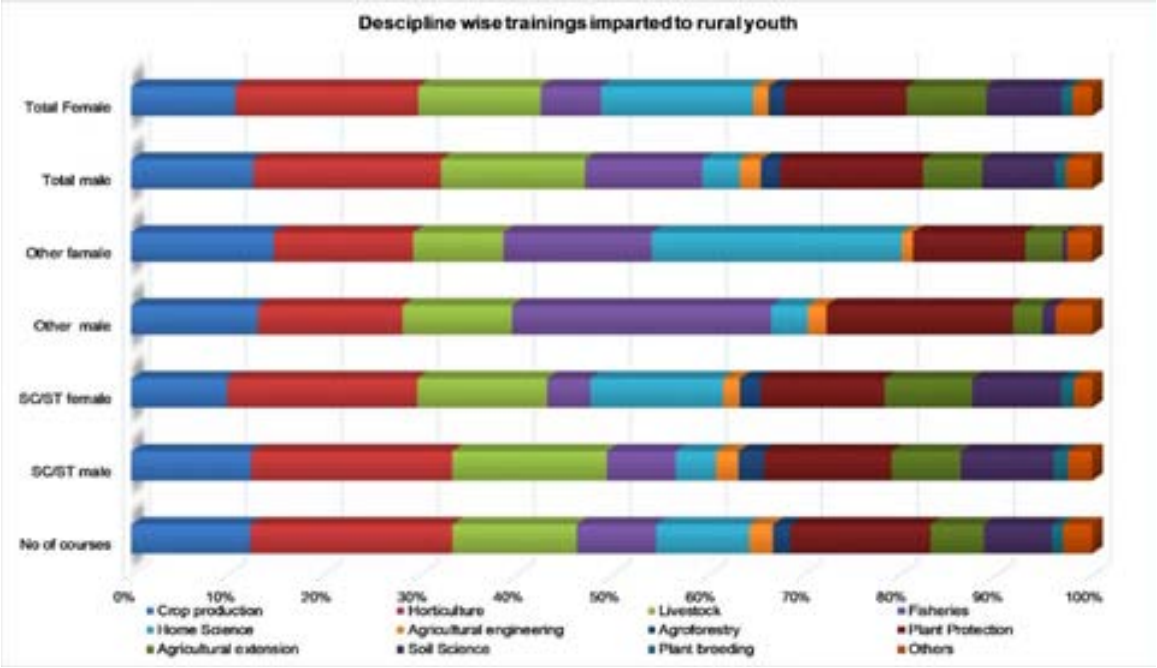
Trainings for rural youth

The KVKs irrespective of states conducted a total of 5356 number of courses to impart vocational trainings to rural youth. Through these courses 69011 male rural youths and 57872 female rural youths were trained. Therefore, the total numbers of rural youth trained by the KVKs were 126883.



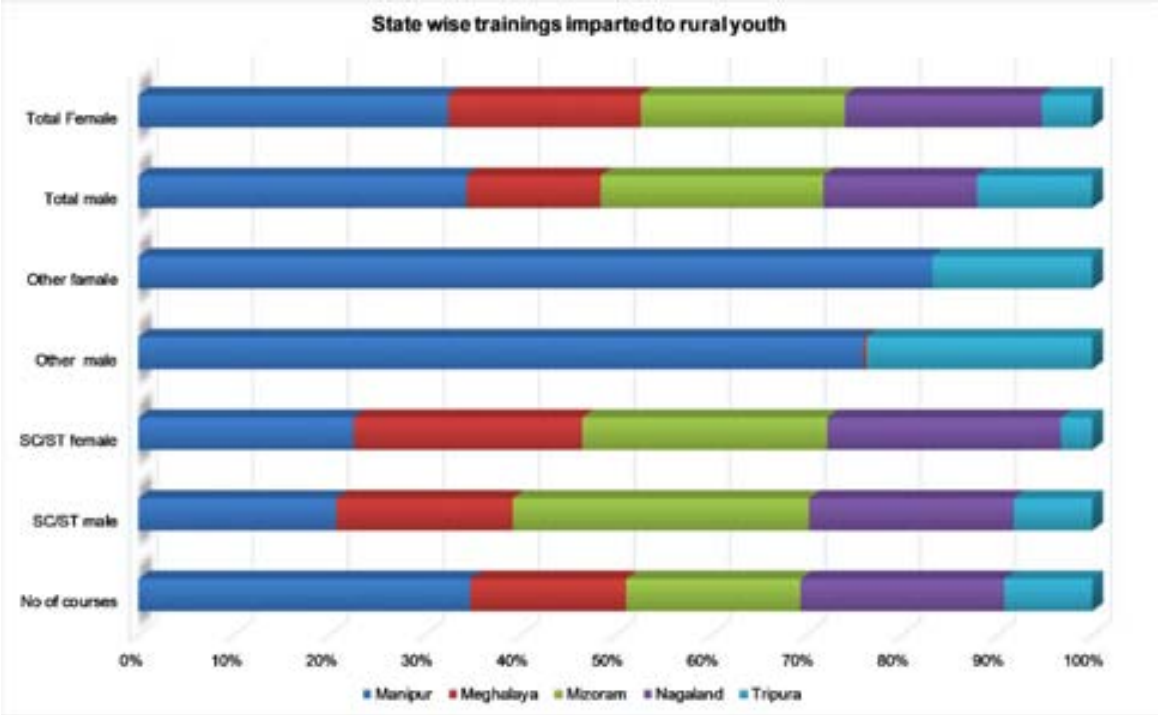
Discipline wise training imparted to rural youth

The figure below reveals that the highest number of trainings was imparted to rural youth in the discipline of horticulture followed by crop production, crop protection and livestock rearing.



State wise training imparted to rural youth

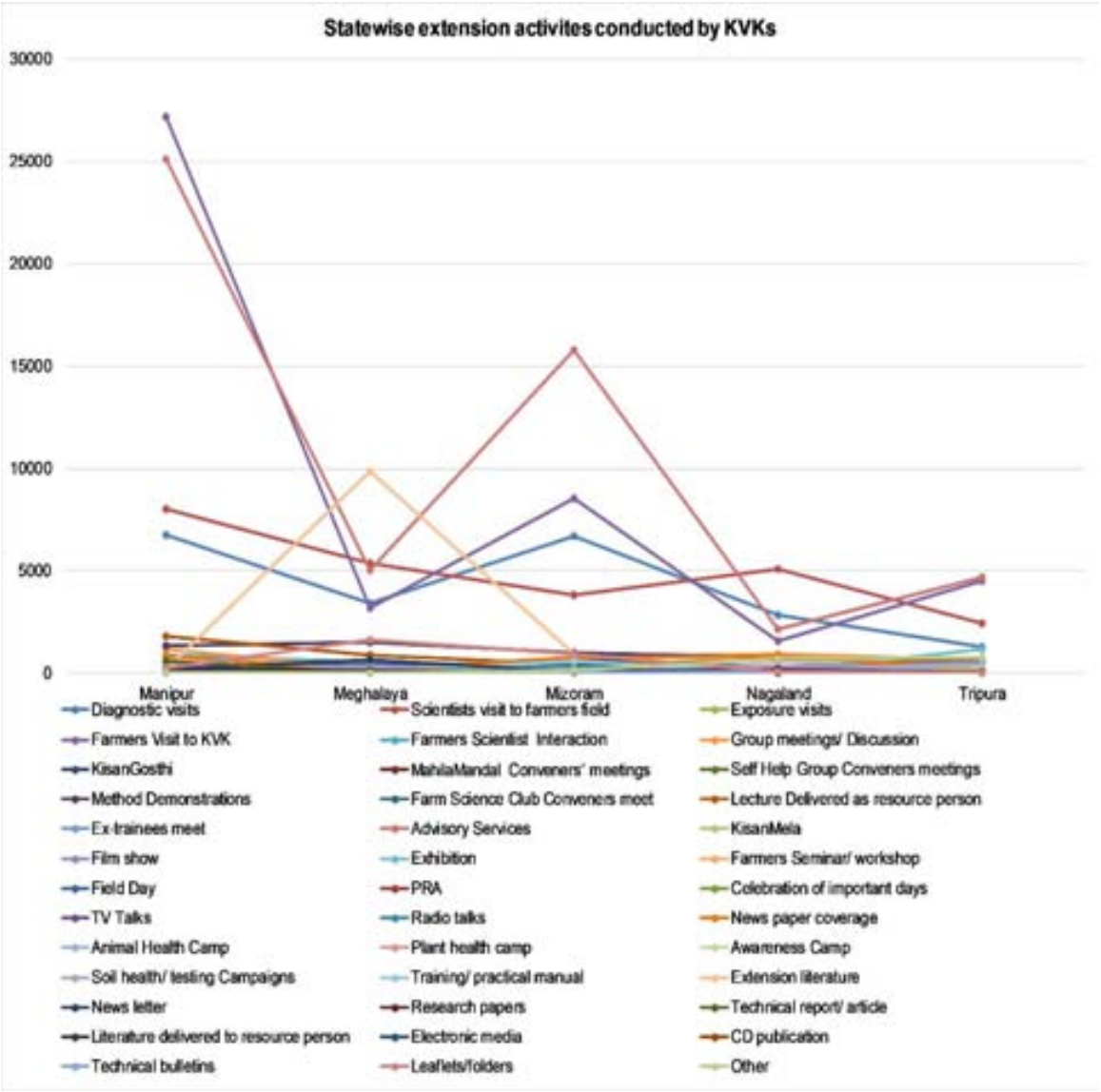
In respect to the state-wise trainings imparted to rural youth, the highest number of courses (1864) were conducted by the KVKs of Manipur followed by Nagaland and Mizoram. Manipur KVKs trained 42000 rural youths followed by KVKs of Mizoram who trained 28000 rural youth with variety of vocational trainings.



Extension Activities

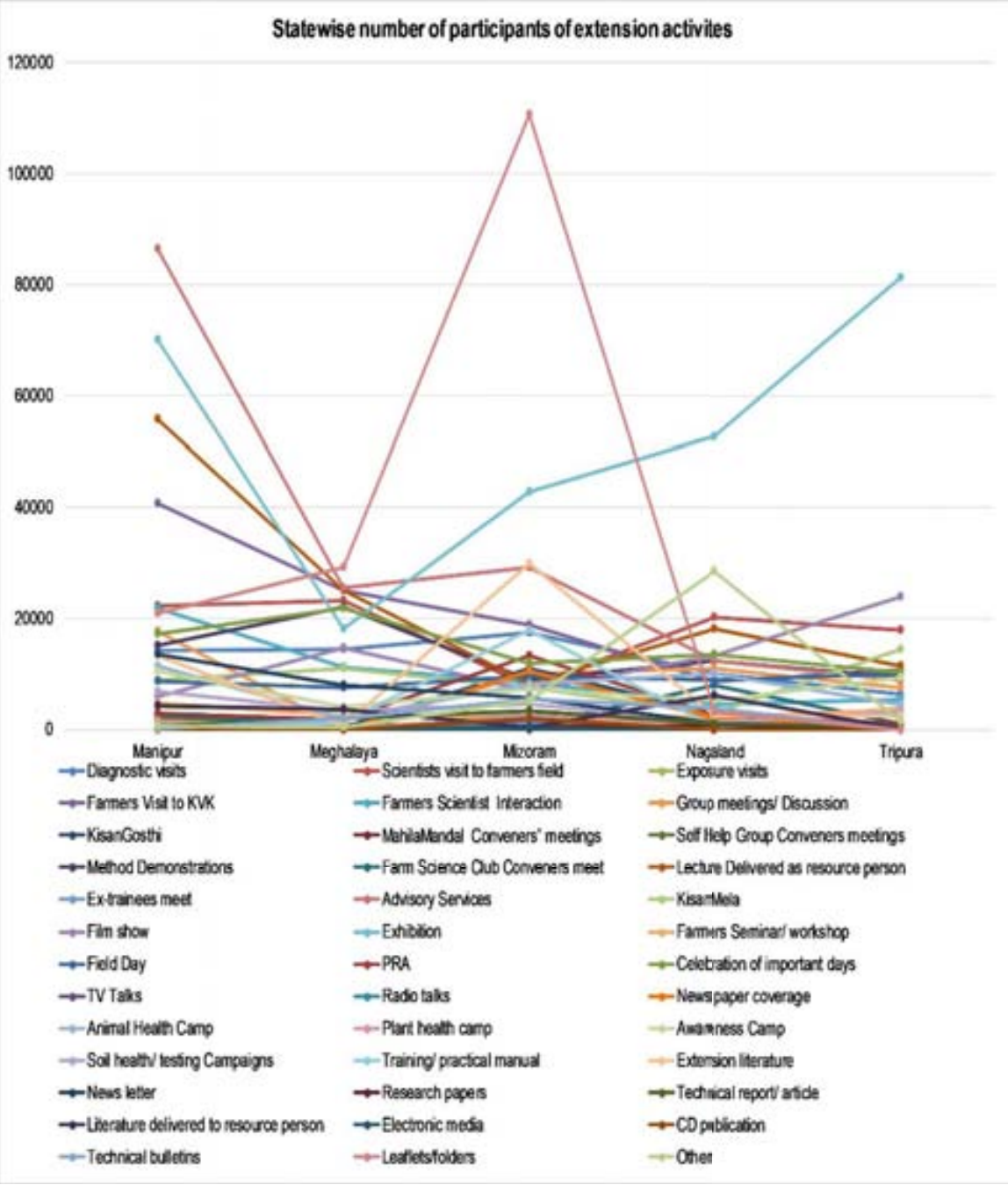
State wise extension activities conducted by KVKs

The extension activities conducted by the KVKs had been categorized into five major groups namely field trips and visits, group activities, mass outreach programmes, camps and campaign, and publications. The figure depicting the state wise extension activities under Field Trips and visits was seen to be highest in farmers visit to the KVKs in Manipur (27183) followed by Mizoram (8564) and least in Nagaland (1575). Under Mass Outreach Programmes, The highest Advisory Services was conducted by the KVKs in Manipur (25092) and least in Nagaland (2176).



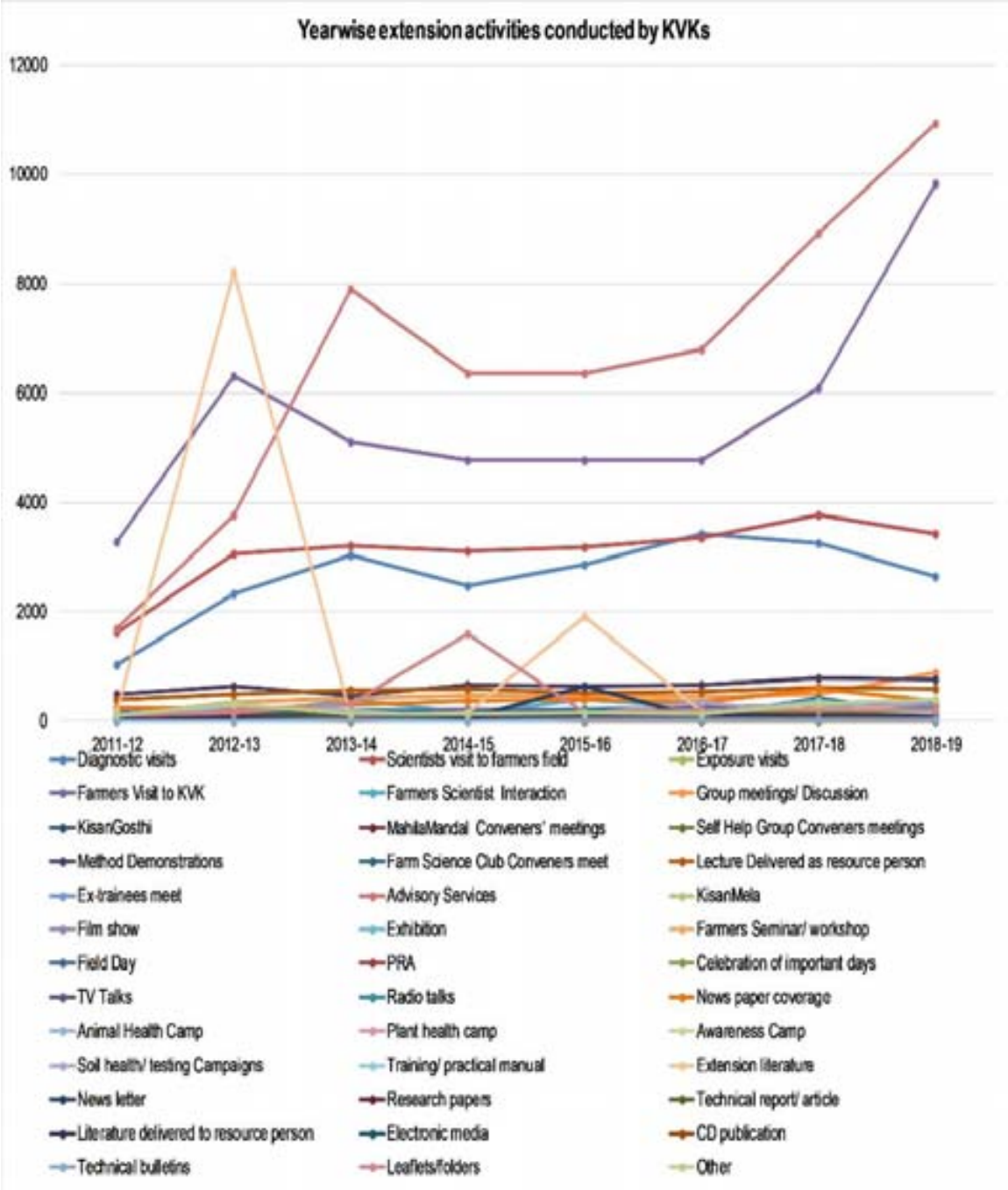
State wise number of participants of extension activities

From the figure it is revealed that the highest number of participants were under the group Publications where leaflets/folders were distributed to the farmers in the KVKs of Mizoram (110712).This is followed by the participation of farmers of Manipur state in advisory services (86509). In Exhibitions, farmers from KVKs in Tripura showed the highest no. (81312 farmers) of participation. The least number of participants was lowest in farmer's participation in communication in electronic media.



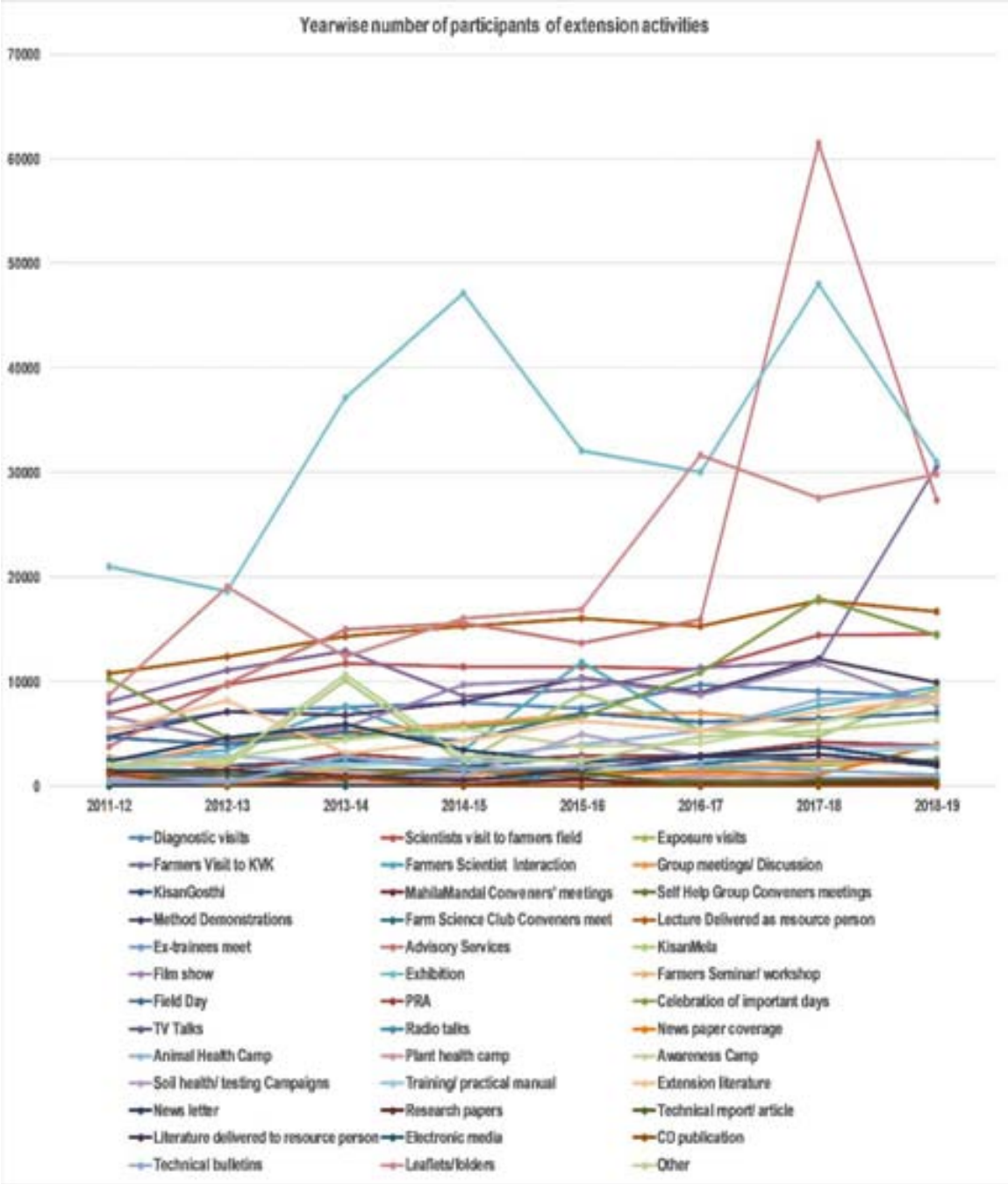
Year wise extension activities conducted by KVKs

From 2011-12 to 2018-19, there has been an increasing trend in extension activities conducted by the KVKs in NER region. Among the five major groups, Advisory Services under Mass outreach shows significant increase in the years followed by farmers visit to KVK under Field Trips and Visit with a total no. of participation of 52738 and 44981, respectively.



Year wise number of participants of extension activities

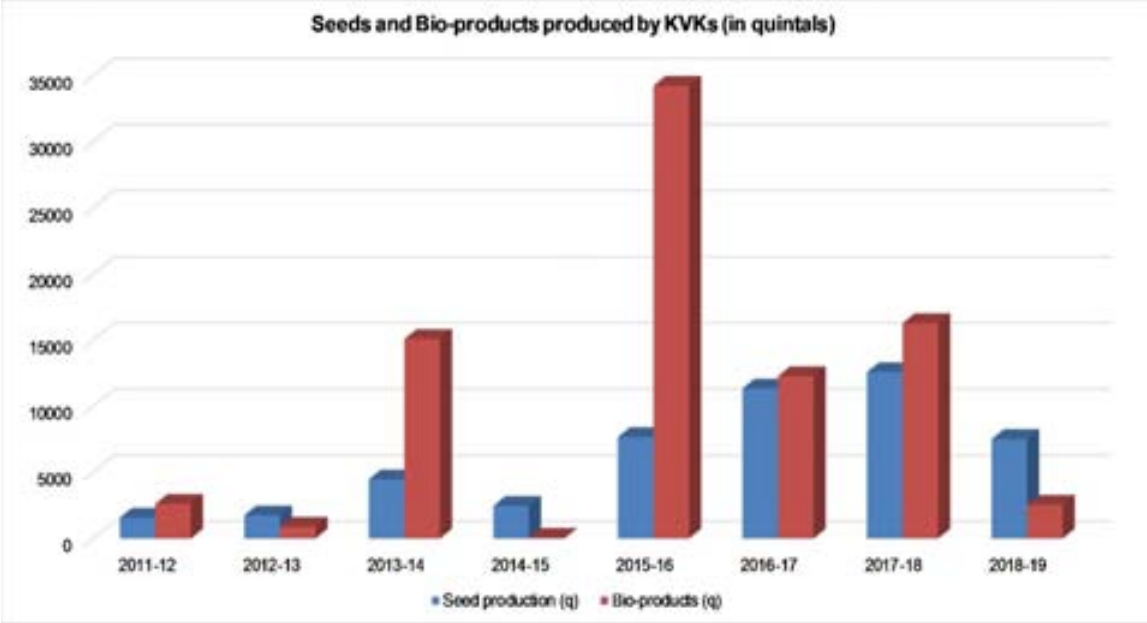
In general the number of participants in various extension activities was found to be increasing over the years. In year 2017-18, the highest numbers of participants (61460) were recorded under advisory services category. However, in general maximum number of participants was seen for exhibitions, advisory services and distribution of leaflets/folders etc.



Production of Seeds and planting material

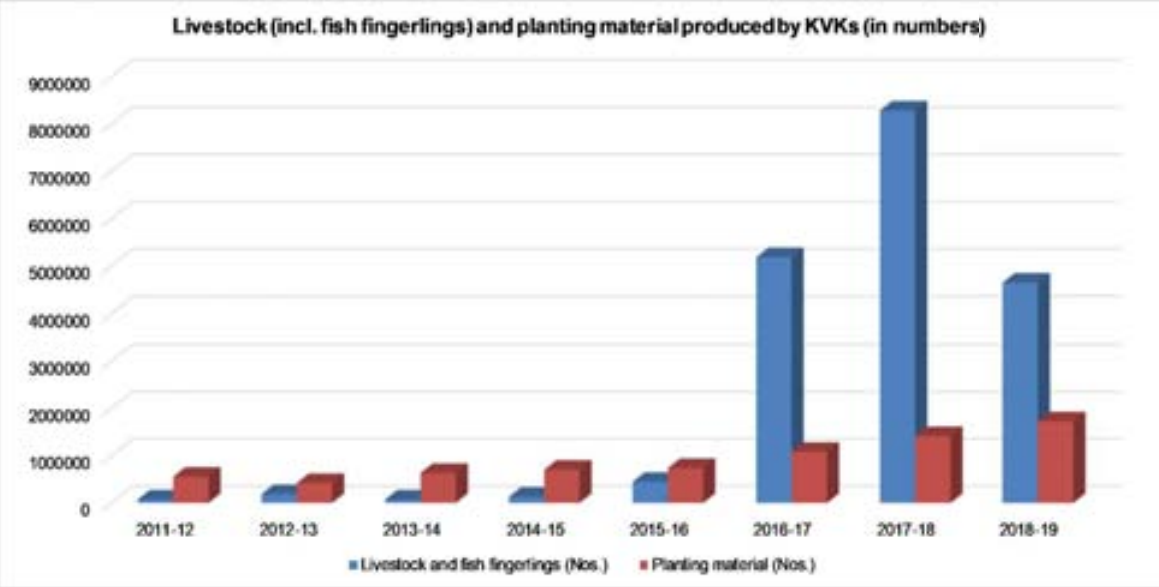
Seeds and bio-products produced by KVKs (in quintals)

Seed Production and Bio-products were among the important activities undertaken by the KVKs of NER from the year 2011-12- to 2018-19. In the year 2015-16, Bio-product produced was highest, which amounts to 34242.27q, however, in 2017-18 there is an increase in the production of both Seeds and Bio-products with a production of 12576.02 q and 16280.25 q respectively when the number KVKs came down to 40 from 87.



Livestock (incl. fish fingerlings) and planting material produced by KVKs (in numbers)

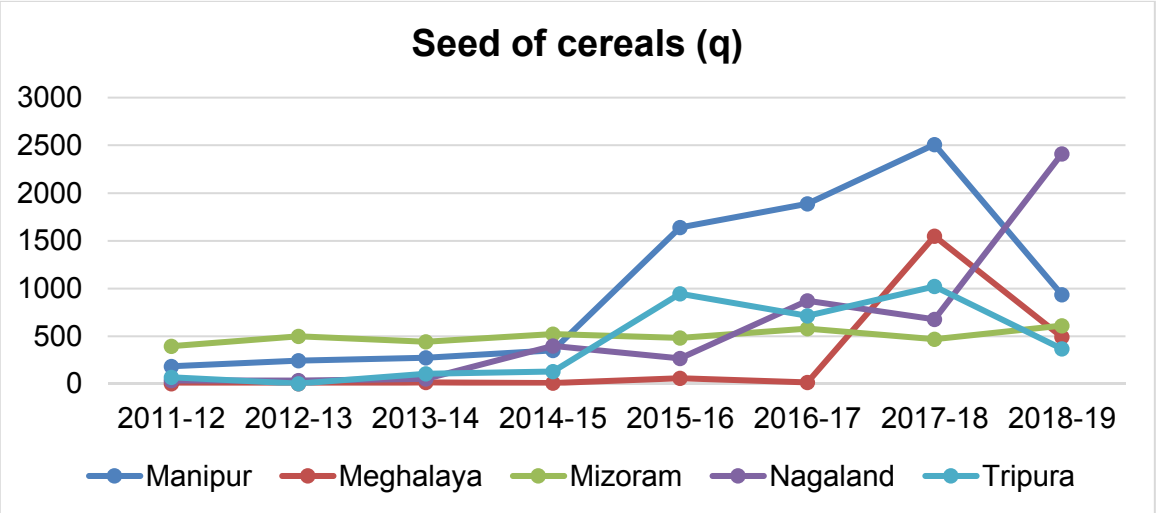
The figure below indicates the production of Livestock (incl. fish fingerlings) and planting material by KVKs during 2011-12 to 2018-19. During the period, the production of Livestock including fish fingerlings was highest in the year 2017-18 with 8289403 numbers followed by 5180611 and 4640455 numbers in 2016-17 and 2018-19, respectively. Planting material (Vegetables, Spices, Fruits, Plantation Crops, *etc*.) produced by the KVKs show significant increase from 555016 numbers in 2011-12 to 1729659 numbers in 2018-19.



Production and distribution of seeds

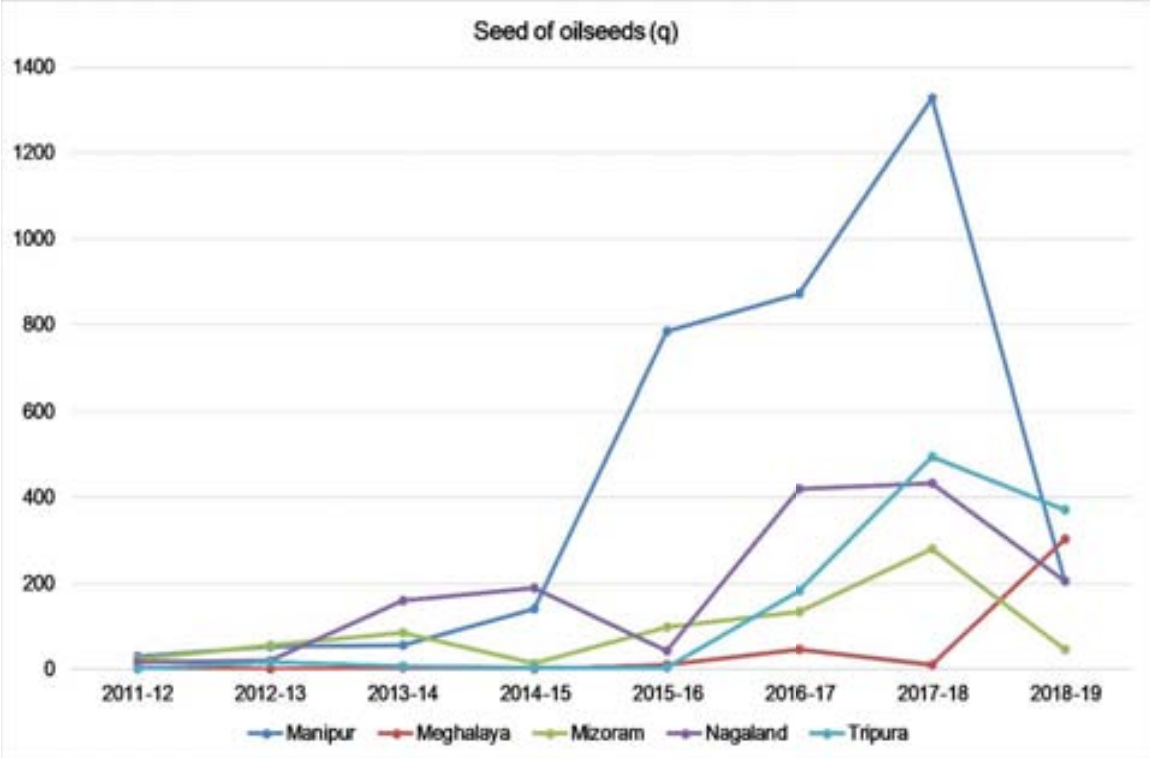
Seed of cereals

The figure presented below reveals that Manipur produced a total of 8026.29 q of seeds during 2011-19. In the year 2017-18, the production of Seeds of cereals was highest amounting to 2508.74 q which however dropped in the year 2018-19 (934.93 q). The KVKs of Mizoram produced more or less a constant amount of seeds of cereals from 2011-12 to 2018-19 ranging from 390 q to 620 q. Meghalaya has least production over the years except for the year 2017-18 (1547.61q). KVKs in Nagaland show significant increase in the production of Seeds of cereals over the years with production of 2411.34 q in the year 2018-19.



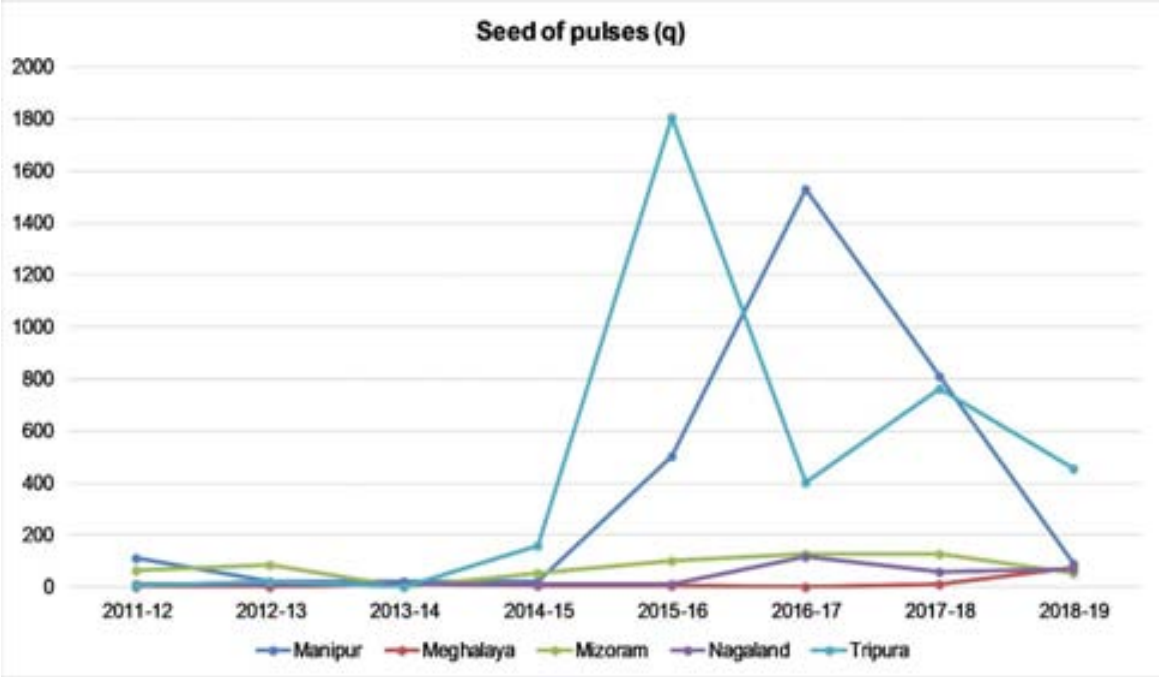
Seed of oilseeds

The production of Oilseeds was seen to be highest in the state of Manipur, wherein the production in the year 2017-18 was 1328.2 q and the same was dropped to 203.71 q in 2018-19. Meghalaya shows significant increase over the years, in 2011-12 the production was 2.11 q and it rose to 303.16 q during 2018-19.



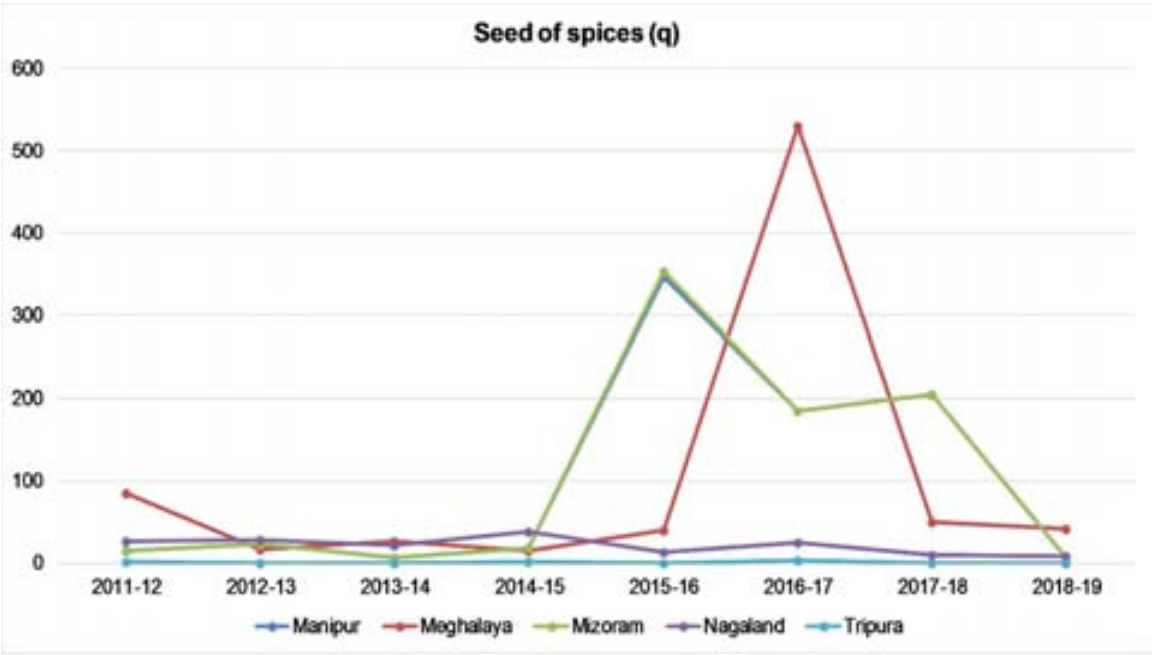
Seed of pulses

Among all the states, the contribution of the KVKs of Manipur and Tripura is highest in respect of the production of seeds of pulses during 2011-19. KVKs in Tripura produced 1804.54 q of seeds in 2015-16 and 453.9 q in the year 2018-19 whereas the KVKs of Manipur produced 1531.5 q in the year 2016-17 which, however dropped significantly in the subsequent years.



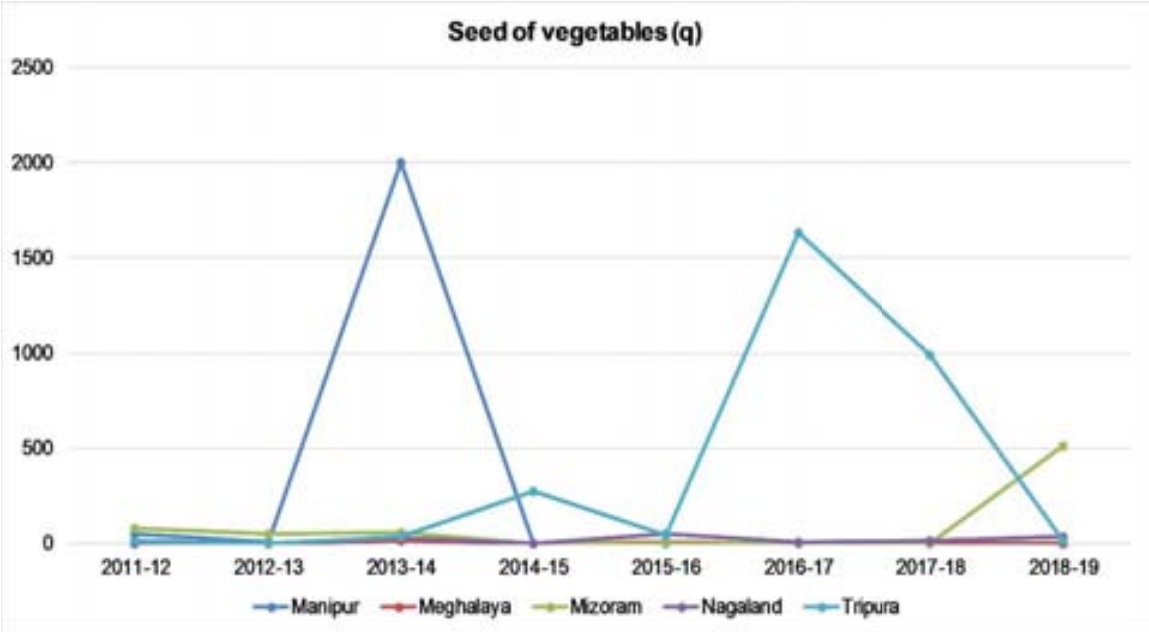
Seed of spices

During the year 2015-16, Meghalaya produced 529.8q of seeds of spices, which was highest in comparison to other states. Mizoram, however produced 353.2 q, 184.3 q and 205.2 q in the year 2015-16, 2016-17 and 2017-18, respectively. This shows potential of increasing spice production if certain package and practices are taken into consideration.



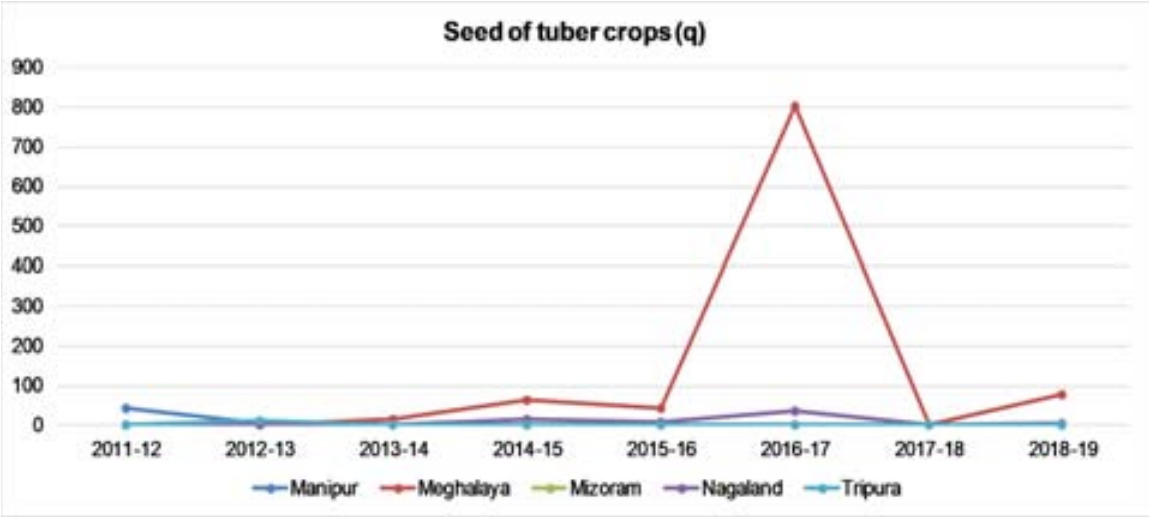
Seed of vegetables

The graph below shows the production of seeds of vegetables by the KVKs of the NER region from 2011-12 to 2018-19. Tripura and Manipur produced the highest in the year 2013-14 and 2016-17 with a productivity of 1629.58 q and 2000.93 q, respectively.



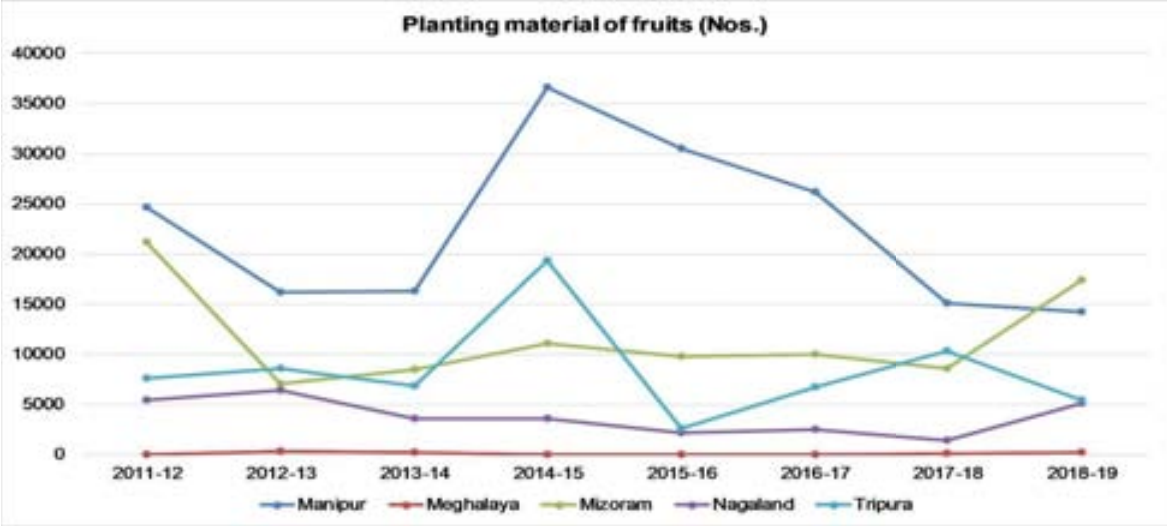
Seed of tuber crops

Seeds of tuber crops produced by the KVKs of Meghalaya were highest in the year 2016-17 with a total production of 803q. The production is however meagre in other states in the NER region.



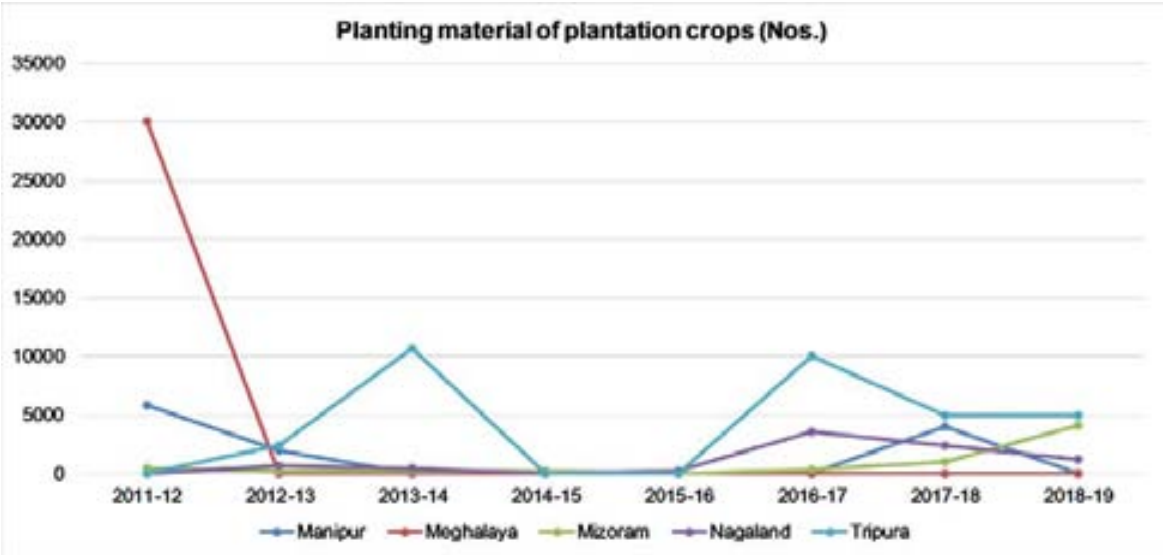
Planting material of fruits

The graph below depicts the numbers of planting material of fruits produced by KVKs in 5 states of NER region. KVKs of Manipur produced the highest numbers of planting material of fruits in the year 2014-15 with 36535 numbers and thereafter it declined. The KVKs of Mizoram had however increased the production from 8600 numbers in 2017-18 to 17340 numbers in 2018-19. In Meghalaya, the production of planting material is very low among all the states.



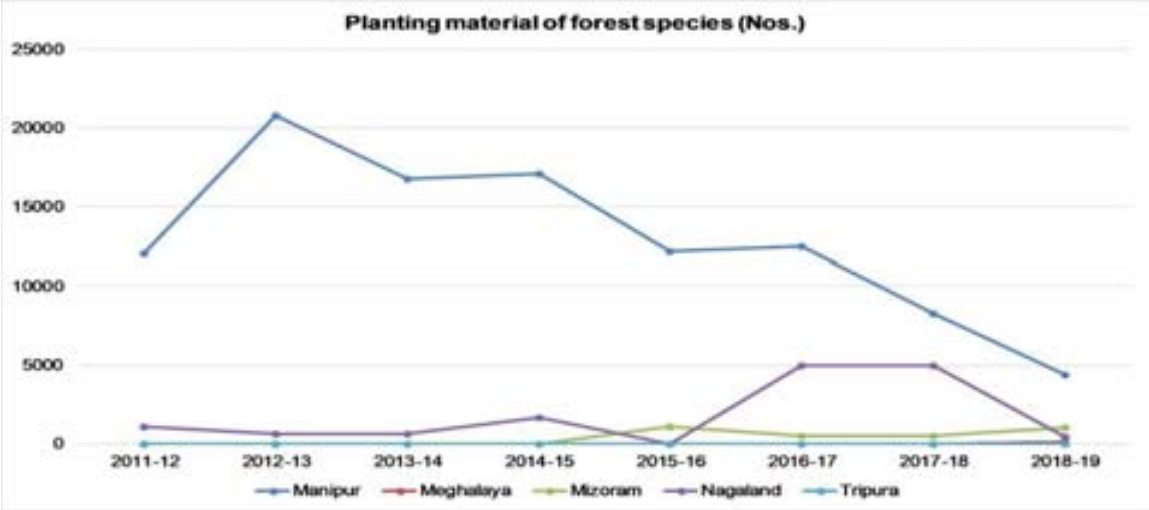
Planting material of plantation crops

The no. of planting material of plantation crops was highest in Tripura comparing to all the KVKs of other states. The KVKs of Tripura in the year 2016-17 produced 10000 numbers. The KVKs of Mizoram increased the production of planting materials of plantation crops from 345 numbers in 2016-17 to 4080 numbers in 2018-19.



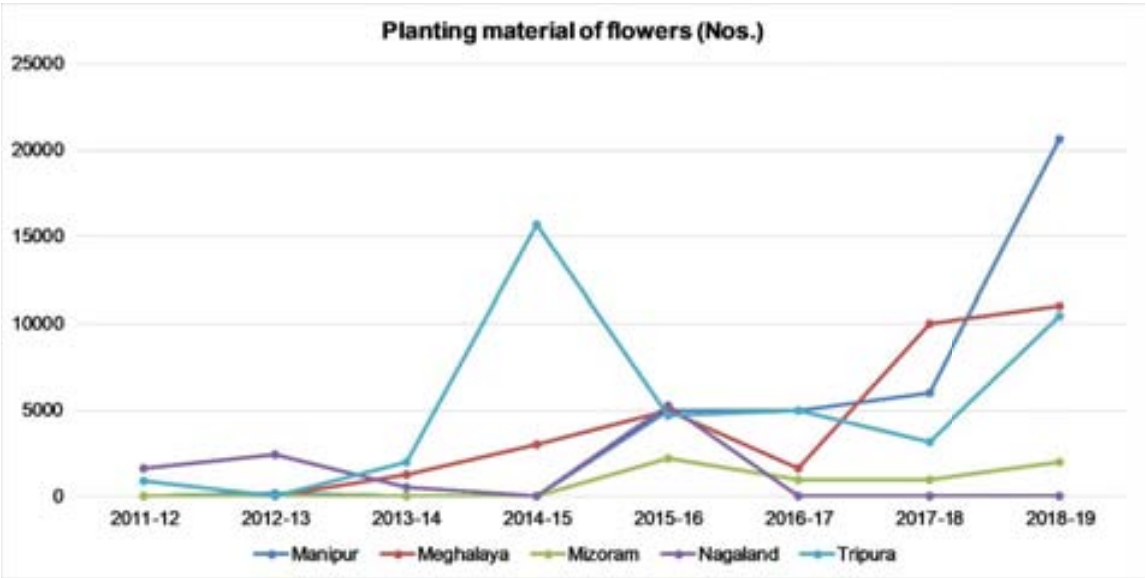
Planting material of forest tree species

From the graph, it can be seen that the production of planting material of forest species was contributed mostly by the KVKs of Manipur. Although over the years, the production decreased but comparing to other states its production is comparatively more. It produced 20800 numbers in the year 2012-13 which however dropped to 4400 numbers in the year 2018-19.



Planting material of flowers

The no. of planting material of flowers produced by KVKs of Manipur shows significant increase especially in the year 2018-19 with a production of 20600 numbers as depicted in the graph. The KVKs of Tripura could produce 15700 numbers in the year 2014-15 which was increased 10400 numbers in the year 2018-19.



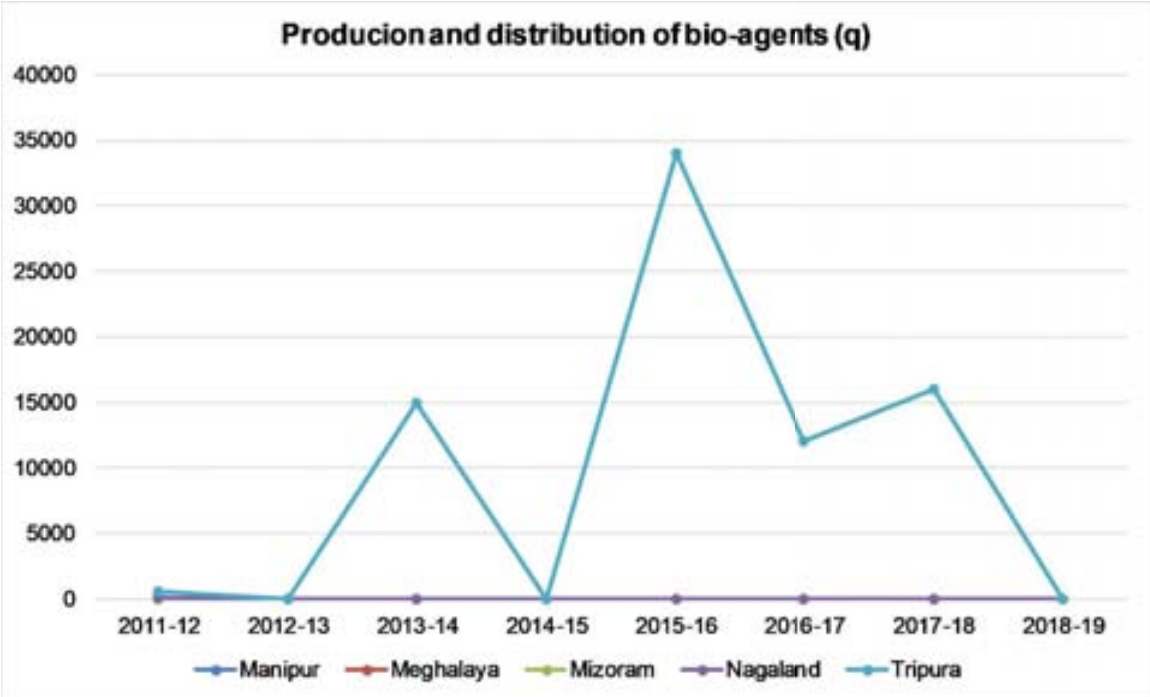
Planting material of other crops

Only the KVKs of Tripura and Mizoram produce Planting material of other crops. KVKs of Tripura had the highest production in the year 2015-16 with 30000 numbers and KVK of Mizoram produced 5000 numbers in the year 2015-16.

Production of bio-products

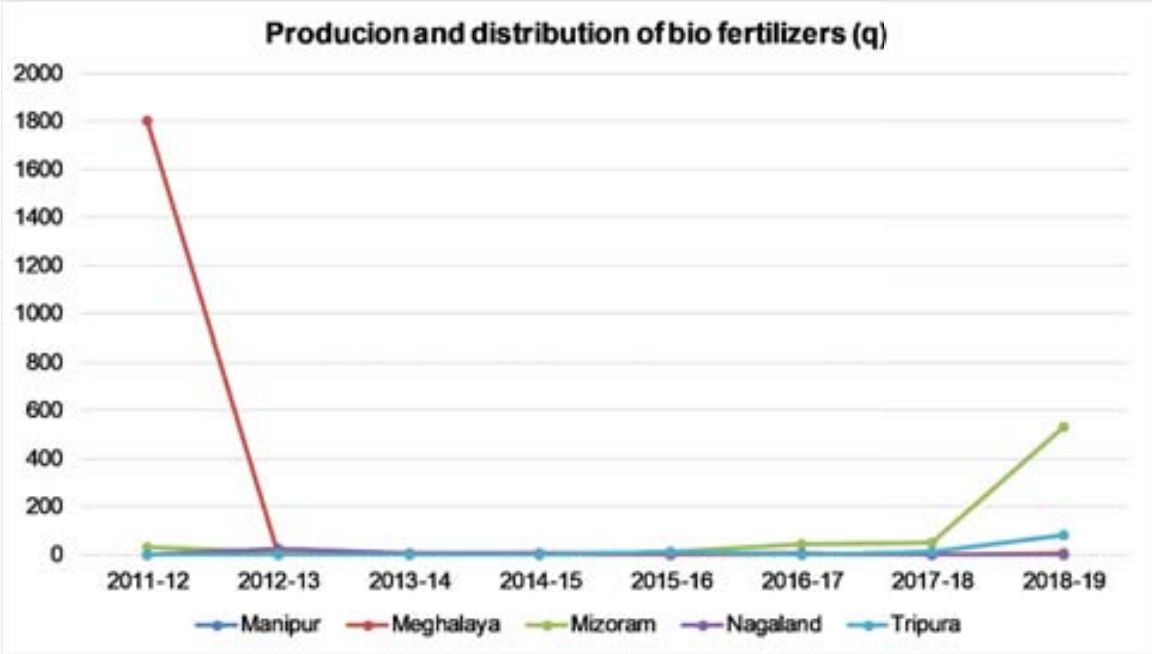
Production of bio-agents

The graph shows the production and distribution of bio-agents wherein only the KVKs of Tripura contributed in the production of bio-agents. Production and distribution of bio-agent was highest in the year 2015-16 with 34000 g and lowest in the year 2018-19 with 23.94 g.



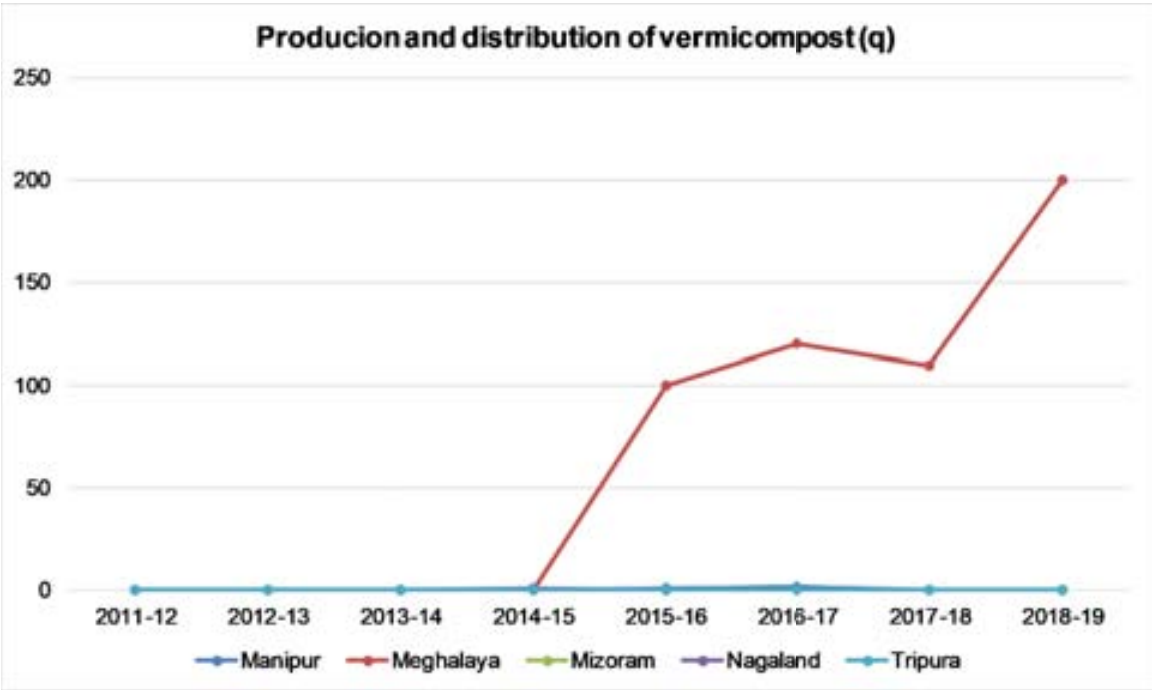
Production of bio-fertilizers

In the year 2018-19, KVKs of Mizoram had the highest production and distribution of bio-fertilizer with a production of 535 q. Except Tripura, other states produced very less quantity of bio-fertilizers.



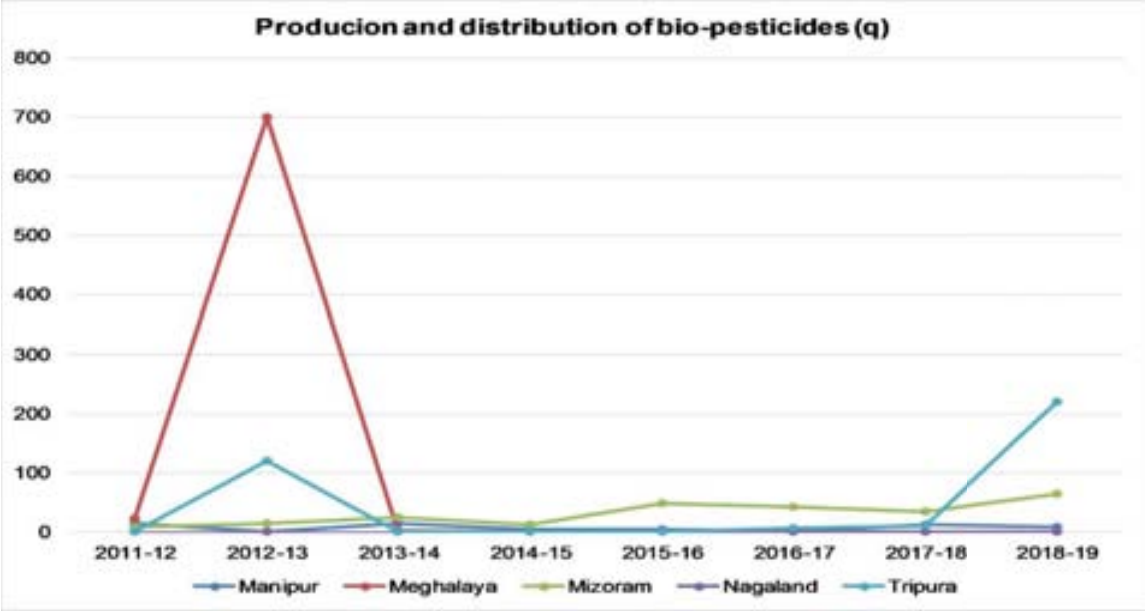
Production of vermicompost

The KVKs of Meghalaya significantly contributed to the production of vermicompost. From the graph, it can be seen that there has been a significant increase in the production of vermicompost from 100q in 2015-16 to 200 q in 2018-19.



Production of bio-pesticides

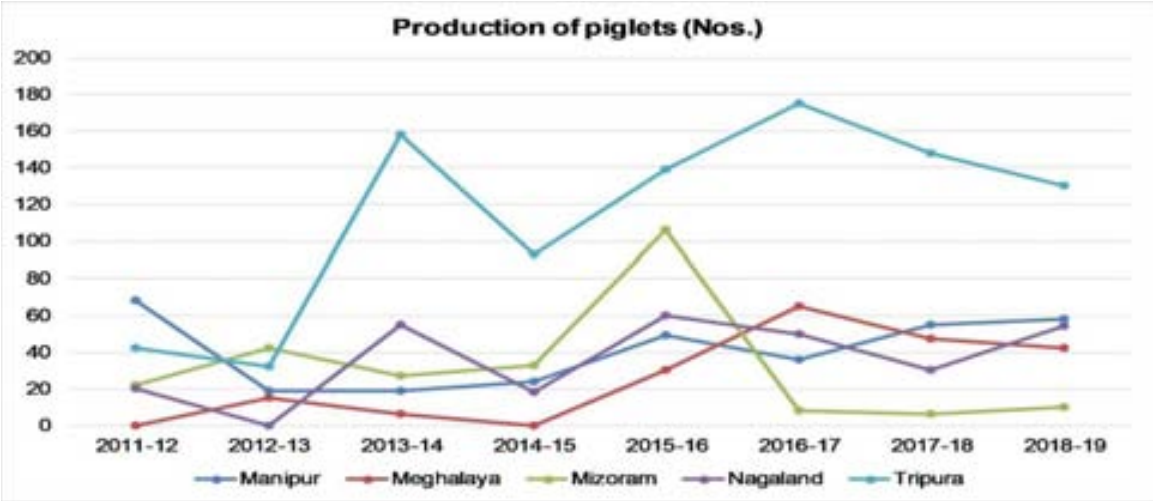
From 2011-12 to 2018-19, KVKs of Tripura produced the highest in the year 2018-19 with 221 g of bio-pesticides followed by KVKs of Mizoram with the production of 64.43 g. The production of bio-pesticides in other states is very negligible.



Production of livestock

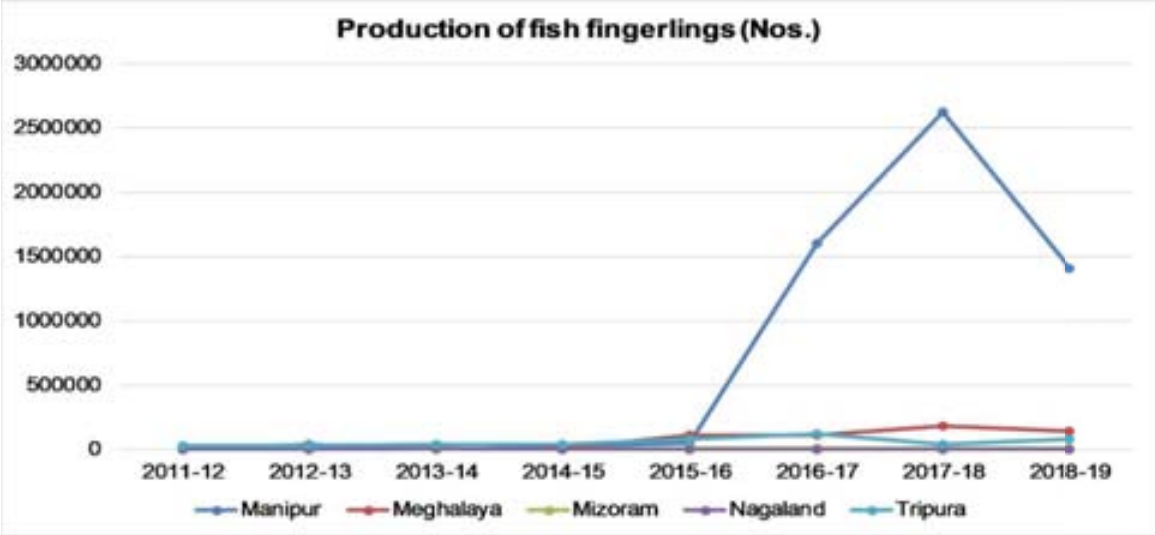
Production of piglets

The KVKs of Tripura produced the highest number of piglets over the years comparing to other KVKs of the region. KVKs in Tripura produced the highest in the year 2016-17 with 175 numbers of piglets. The production of piglets in KVKs of Manipur was 55 piglets in 2017-18 and 58 piglets in 2018-19.



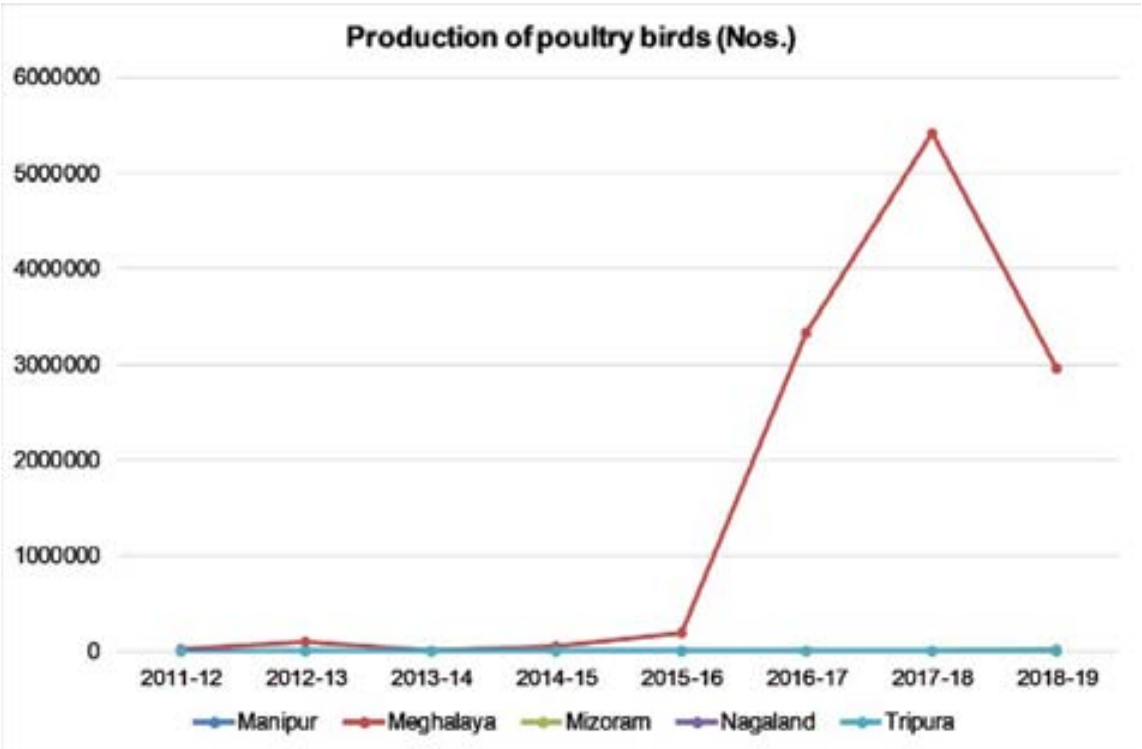
Production of fish fingerlings

In the year 2017-18, production of fingerlings was highest (2617774 numbers) in KVKs of Manipur as depicted in the graph followed by 180000 numbers in Meghalaya in the same period.



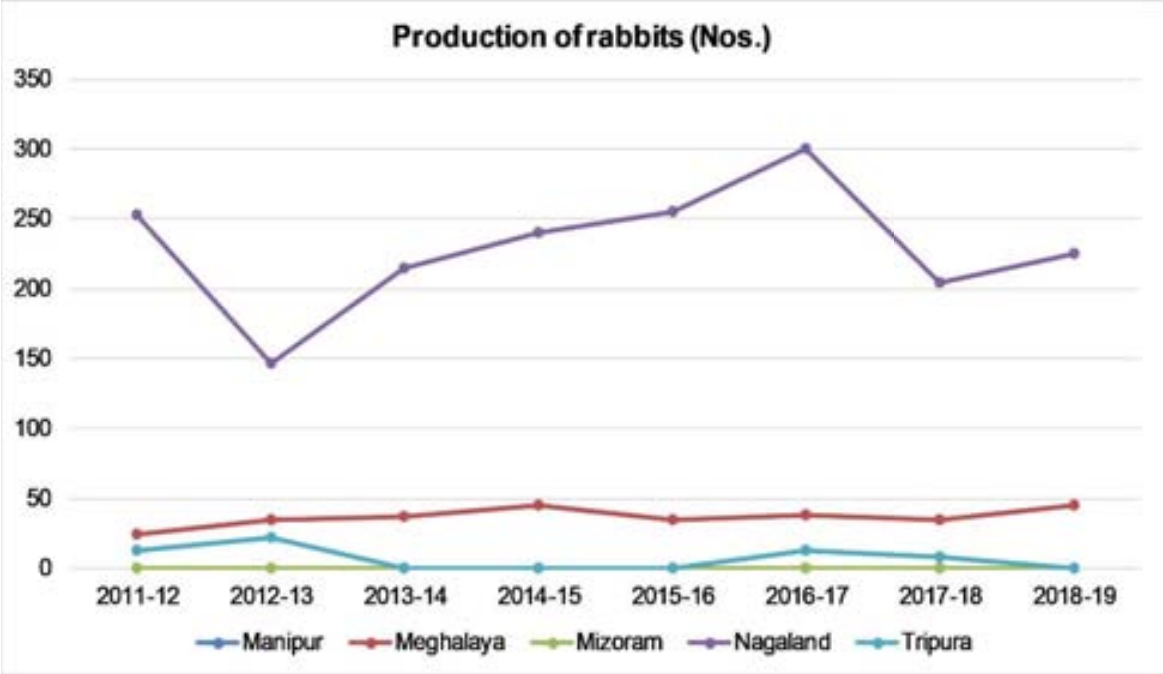
Production of poultry birds

The production of poultry birds was mostly contributed by the KVKs of Meghalaya as seen in the graph. In the year 2016-17, the production of poultry birds was 3323343 numbers which increased to 5425467 in the year 2017-18.



Production and distribution of rabbits

From the graph, it can be seen that the production of rabbits was highest in Nagaland comparing to all the other KVKs of the region. In the year 2016-17, KVKs of Nagaland produced the highest numbers of rabbits i.e. 300. This is followed by the KVKs of Meghalaya where in the year 2018-19 the production of rabbits was 45 numbers.

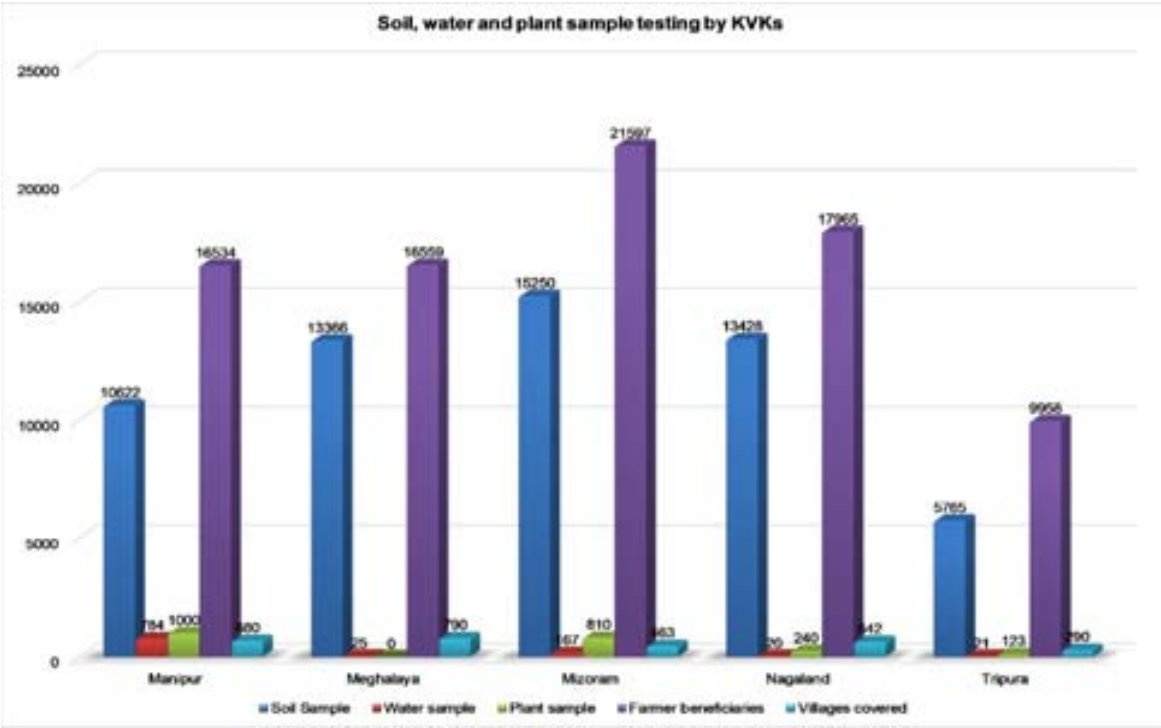


Soil, water and plant sampling

Summary of sampling of soil, water and plant samples

The graph depicts that among the five states under ATARI Zone-VII, the KVKs of Mizoram conducted the highest number of soil test with 15250 samples while the KVKs of Tripura conducted the least with 5765 samples. Also, the KVKs of Manipur conducted the highest number of water test with 784 samples while the KVKs of Tripura conducted the least with 21 samples. Likewise, the KVKs of Manipur conducted the maximum number of plant test with 1000 samples while the KVKs of Meghalaya conducted the least with zero samples.

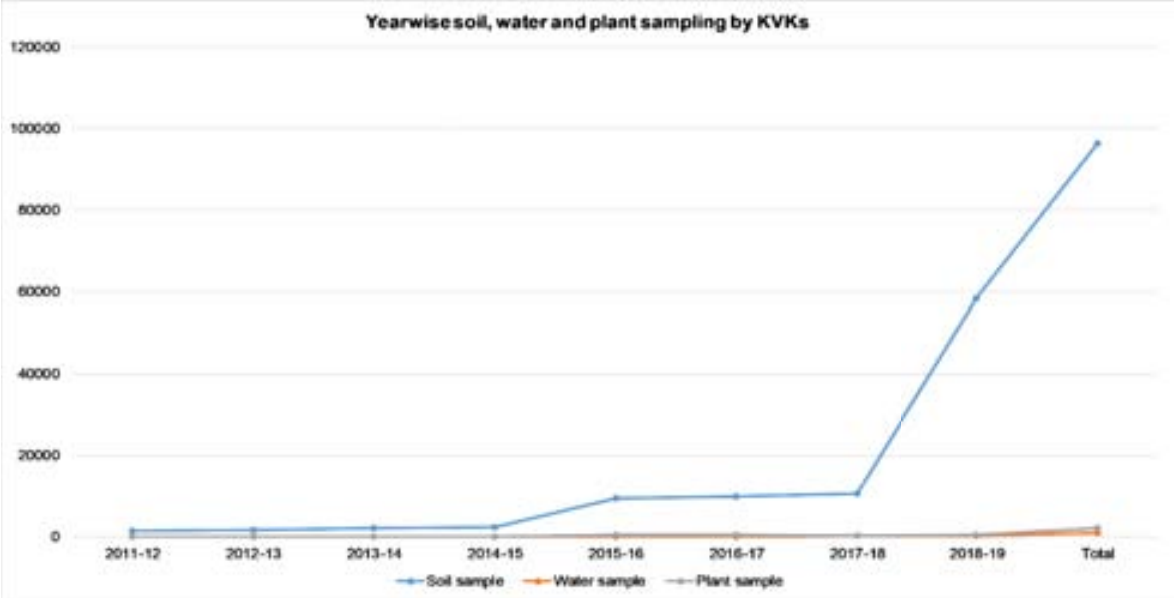
It can also be concluded from the graph that majority of the farmers (21597) benefited from soil, water and plant sampling belong to Mizoram while only 9958 beneficiaries belong to Tripura. Meghalaya had the maximum number of villages covered (790) under soil, water and plant sampling while Tripura had the least with 290 villages covered.



Year wise soil, water and plant sampling

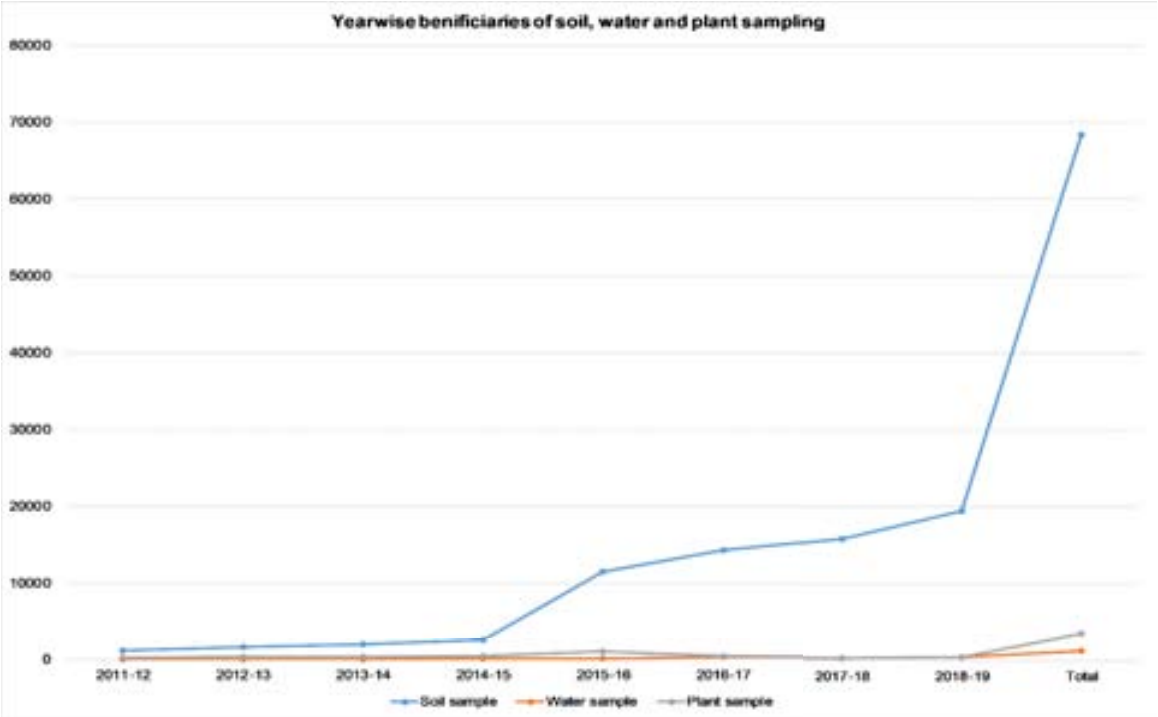
From the graph, it can be concluded that during the year 2011 to 2019, soil sample analyzed ranged from 1520 to 96353 numbers, plant sample analyzed ranged from 175 to 2201 numbers and water sample analyzed ranged from 0 to 1051numbers. It can be

clearly seen that the quantity of soil sample testing had been increased since 2014-15 and got momentum during 2017-19.



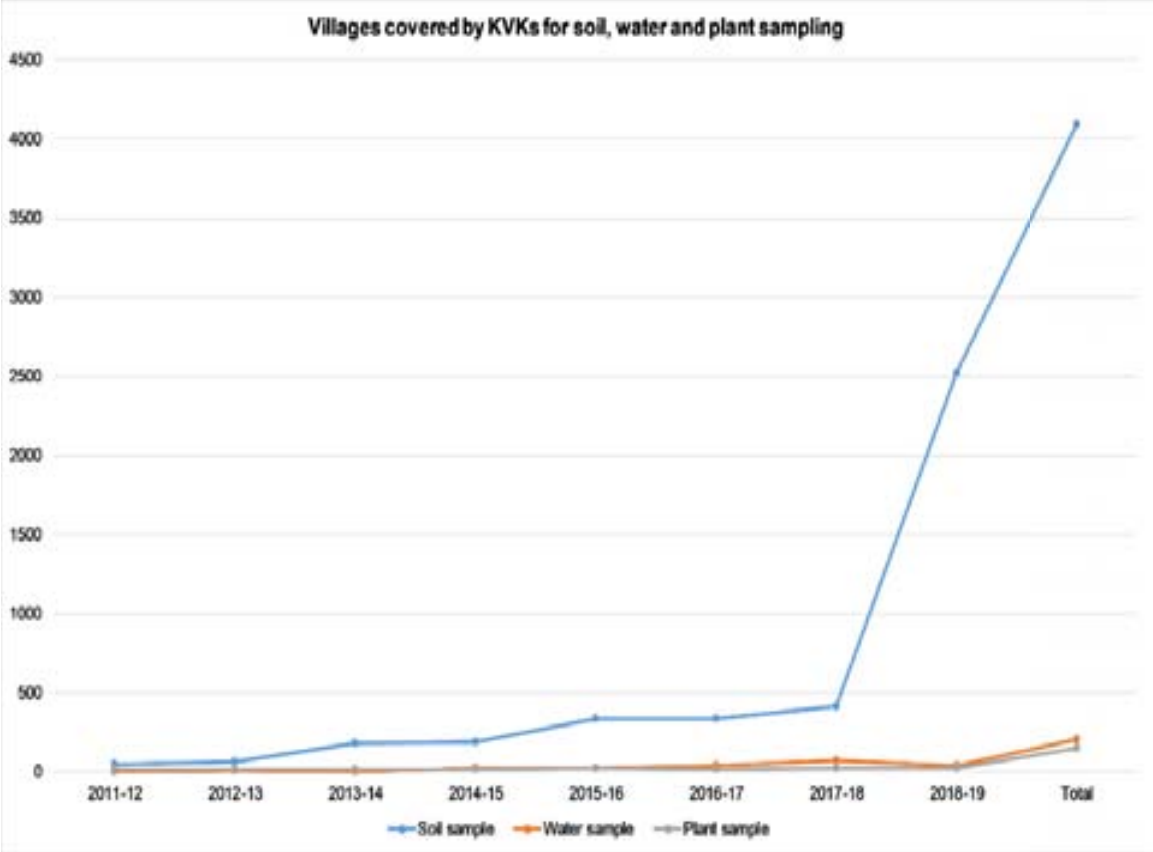
Year wise beneficiaries of soil, water and plant sampling

From the graph, it can concluded that during the year 2011 to 2019, the no. of beneficiaries of soil sampling ranged from1130 to 68368, beneficiaries of plant sampling ranged from217 to 3507 and beneficiaries of water sampling ranged from 0 to 1314. The graph reveals that since 2014-15 the number of beneficiaries is significantly increased for soil sampling category.



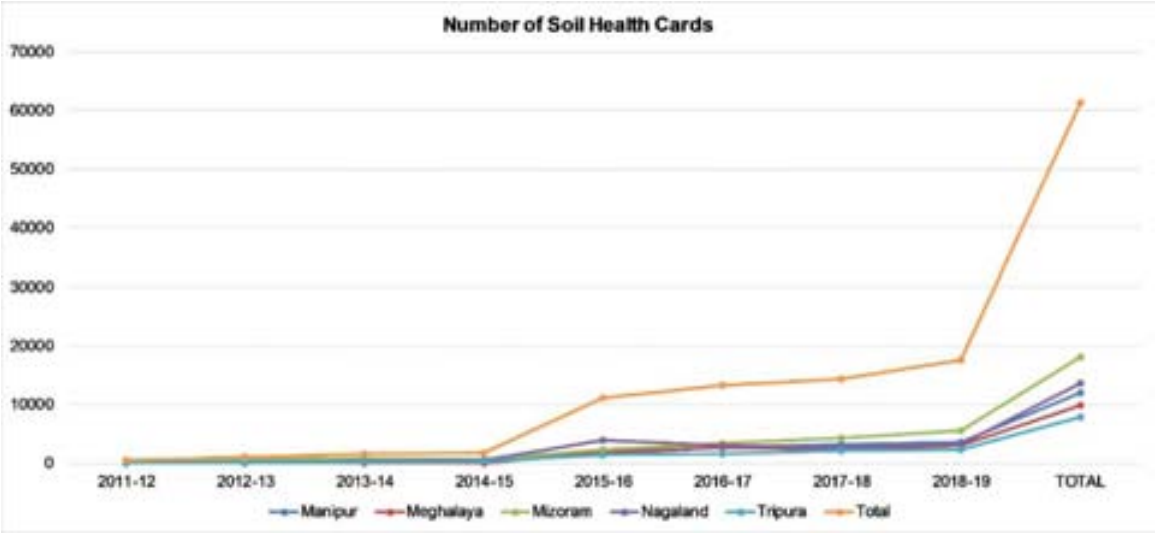
Villages covered by KVKs for soil, water and plant sampling

From the graph, it can be concluded that during the year 2011 to 2019, villages covered under soil sampling ranged from 51 to 4086, villages covered under plant sampling ranged from 12 to 145 and villages covered under water sampling ranged from 0 to 205. The graph clearly shows that since 2012-13, KVKs of Zone-VII are maximizing their efforts to conduct soil, water and plant sample testing in larger number of villages. Till today, around 4000 villages are benefited under this category.

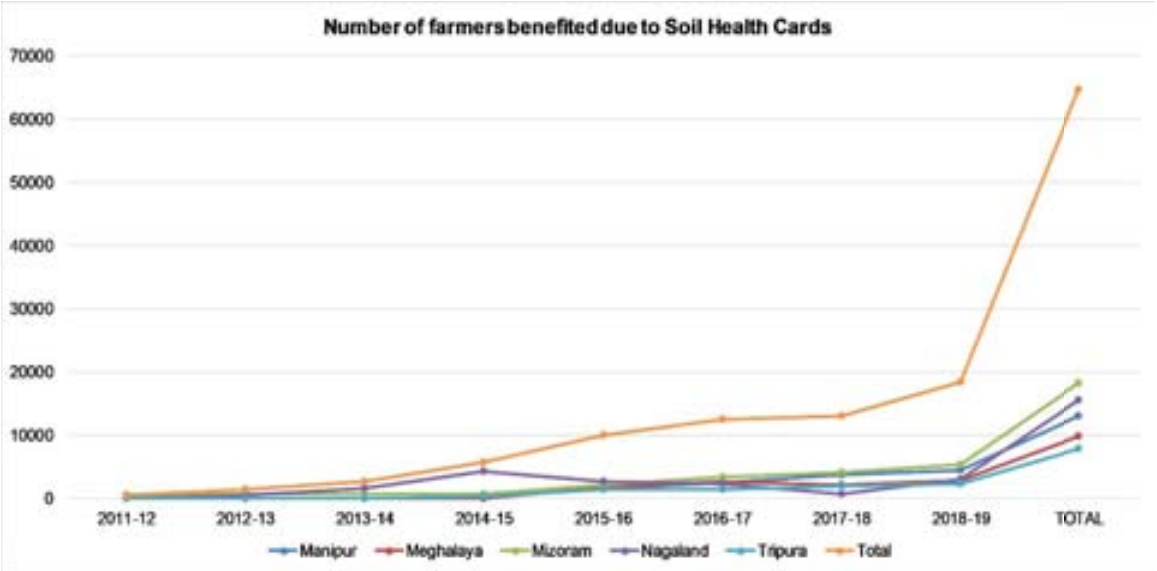


Soil Health Cards

The graph depicts that out of 64689 soil health cards issued, the state of Mizoram issued the highest soil health cards i.e. 18211 while Tripura issued the least with 7791 number of soil health cards. The no of soil health cards in increased linearly from 2014-15 irrespective of states in the region.



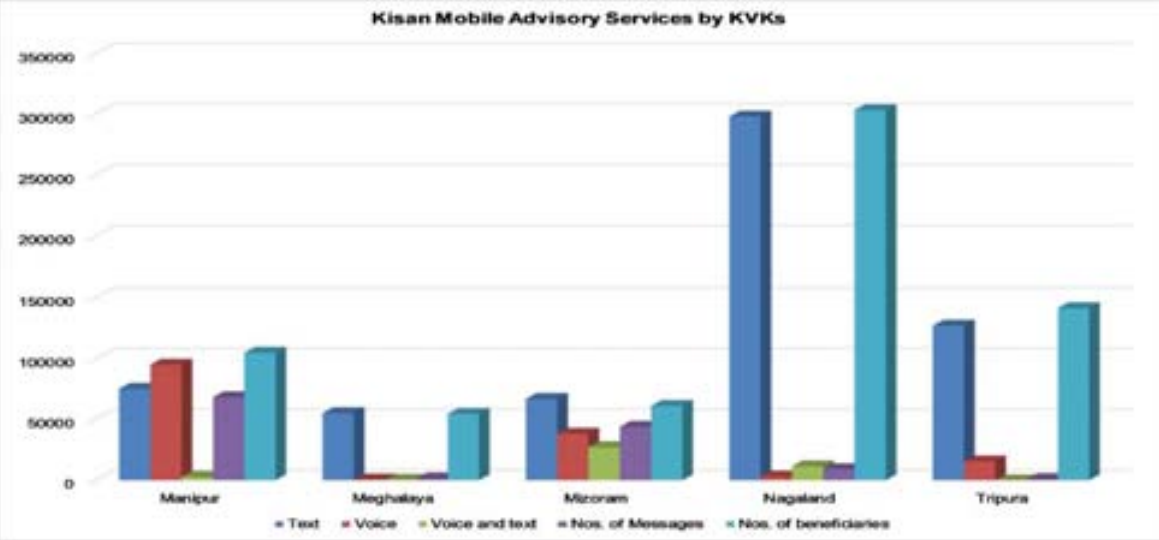
The graph reveals that out of 64689 farmers benefited from soil health cards, highest number farmers (18211) belong to Mizoram, while only 7941 farmers benefited from Tripura. As there were only four KVKs under Tripura state, their achievements are relatively smaller than other states. The no. of beneficiaries in Nagaland and Manipur were 15000 and 13000, respectively.



Kisan Mobile Advisory Services

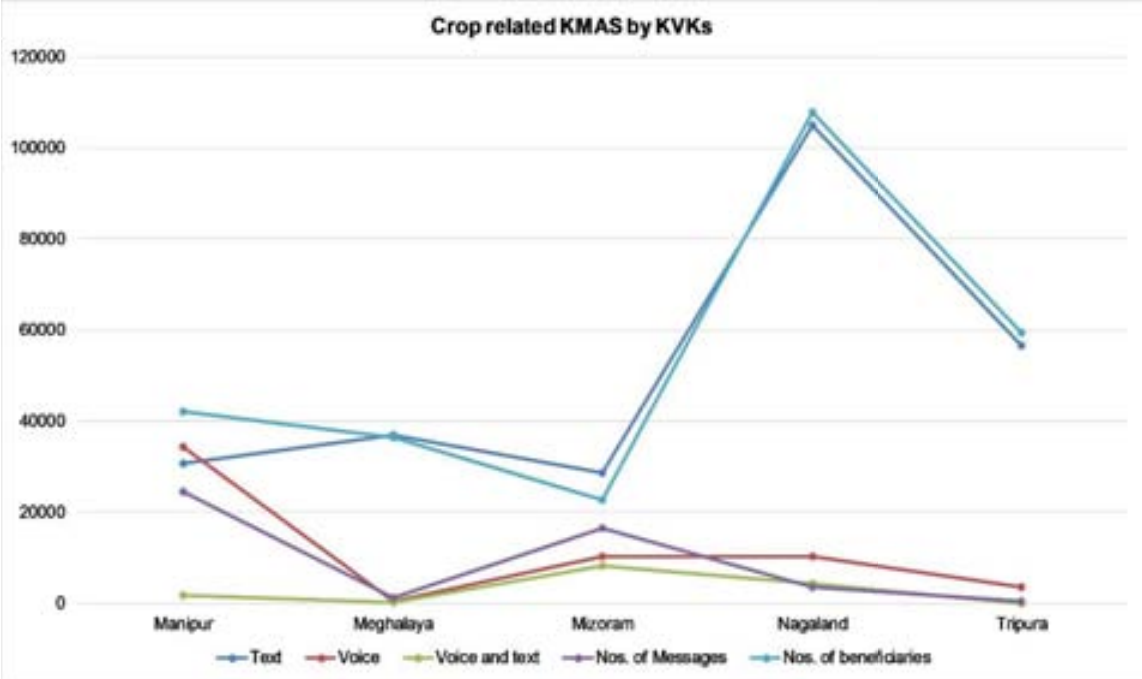
State wise summary of KMAS

Nagaland (297992) had the highest and Meghalaya (55228) had the least nos. of text messages sent during the years 2011-19. Likewise, Manipur (95025) had the highest and Meghalaya (649) had lowest nos. of voice messages delivered. In reference to both voice and text type, Mizoram (27226) had the highest. With reference to number of messages and number of beneficiaries, Manipur (68318) had the highest nos. of messages benefitting 104770 nos. of farmers and Tripura (43993) had the least nos. of messages benefitting 141615 nos. of farmers.



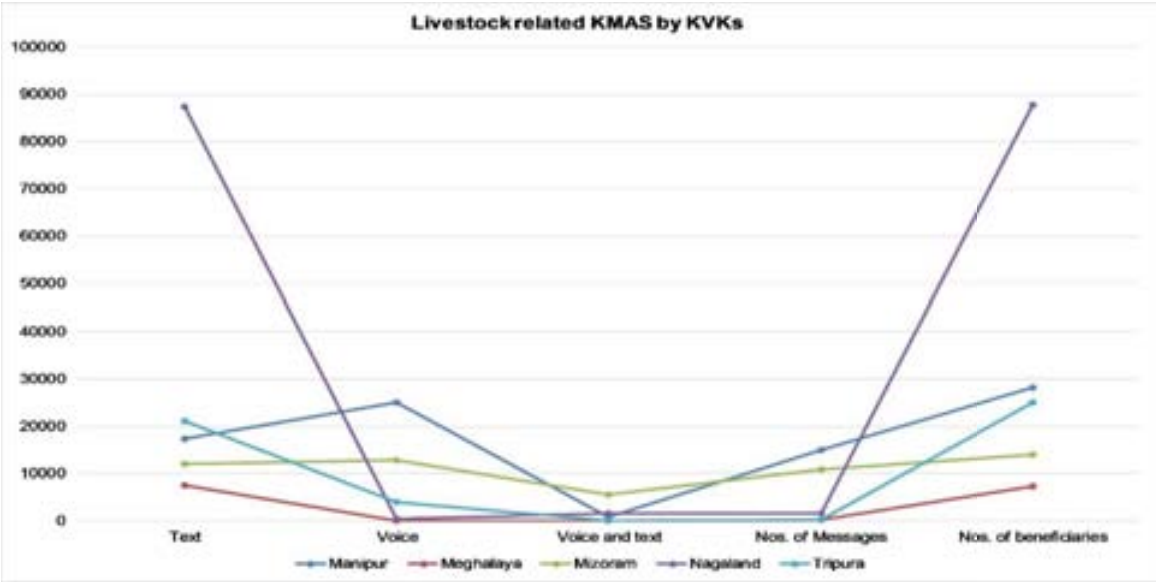
Crop related KMAS

It is seen from the graph that with reference to the number of Kisan Mobile Advisory Services (KMAS), Nagaland (105051) had the highest and Mizoram (28669) had the lowest nos. of texts during the years 2011-19. With reference to voice type, Manipur (34281) had the highest and Meghalaya (509) with the lowest nos. of voice type. With reference to both voice and text type, Mizoram (8195) had the highest and Tripura with none. With reference to number of messages and number of beneficiaries, Manipur (24551) had the highest nos. of messages benefitting 42127 nos. of farmers and Tripura (459) with the least nos. of messages benefitting 59533 nos. of farmers. In addition, KVKs of Nagaland sent 3435 messages to benefit 107922 farmers in the state.



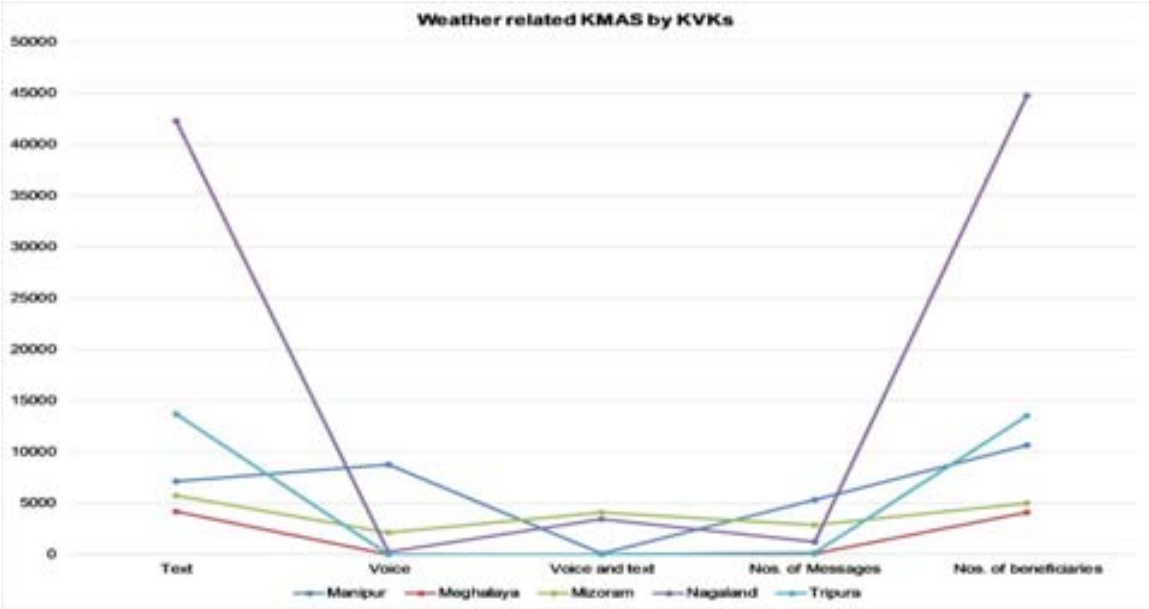
Livestock related KMAS

It is seen from the graph that with reference to the number of texts Nagaland (87280) had the highest and Meghalaya (7558) had the lowest nos. of texts during the years 2011-19. With reference to voice, Manipur (25125) had the maximum and Tripura (4013) with lowest nos. of voice type. With reference to both voice and text type, Mizoram (5591) had the highest and Tripura with none. With reference to number of messages and number of beneficiaries, Manipur (14987) had the highest nos. of messages and benefitting 28223 nos. of farmers and Meghalaya (297) with the least nos. of messages benefitting 7337 nos. of farmers. Maximum numbers (87767) of livestock sector farmers are benefited from the KMAS of Nagaland state.



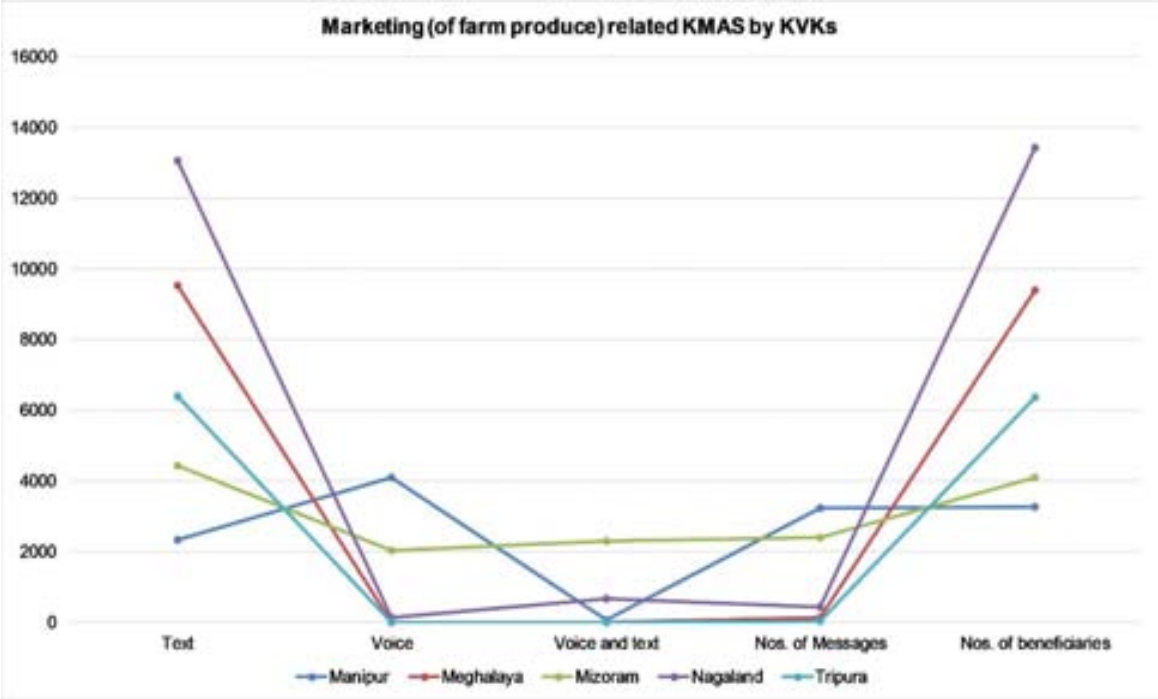
Weather related KMAS

It is seen from the graph that with reference to the number of texts Nagaland (42292) had the highest and Meghalaya (4171) had the lowest nos. of texts during the years 2011-19. With reference to voice, Manipur (8272) had the maximum and Tripura with none. With reference to both voice and text type, Mizoram (4098) had the highest and Tripura with none. With reference to number of messages and number of beneficiaries, Manipur (5272) had the highest nos. of messages and benefitting 10625 nos. of farmers and Meghalaya (79) with the least nos. of messages benefitting 4092 nos. of farmers. Nagaland states' KVKs also have benefited maximum number of farmers through weather related message advisory.

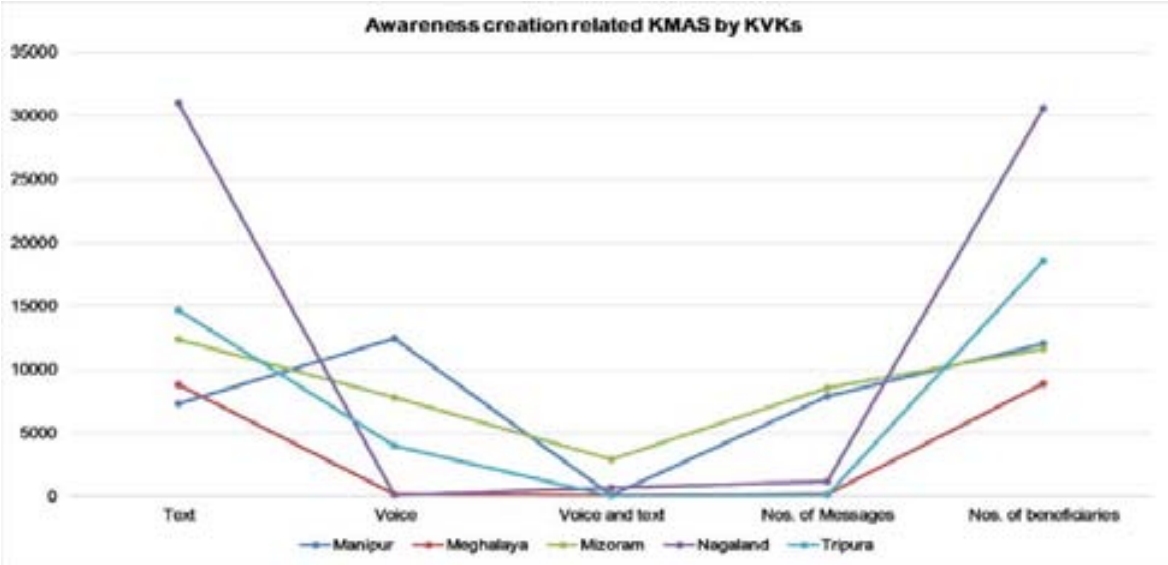


Marketing related KMAS

With reference to the number of texts, Nagaland (13076) had the highest and Manipur (2333) had the lowest nos. of texts during the years 2011-19. With reference to voice type, Manipur (4118) had the maximum and Tripura with none. With reference to both voice and text type, Mizoram (2300) had the highest and Tripura with none. With reference to number of messages and number of beneficiaries, Manipur (3251) had the highest nos. of messages and benefitting 3288 nos. of farmers and Tripura (33) with the least nos. of messages benefitting 6375 nos. of farmers. The KVKs of naganld have sent maximum text messages related to marketing of farm produce and benefited maximum number (13440) of farmers.



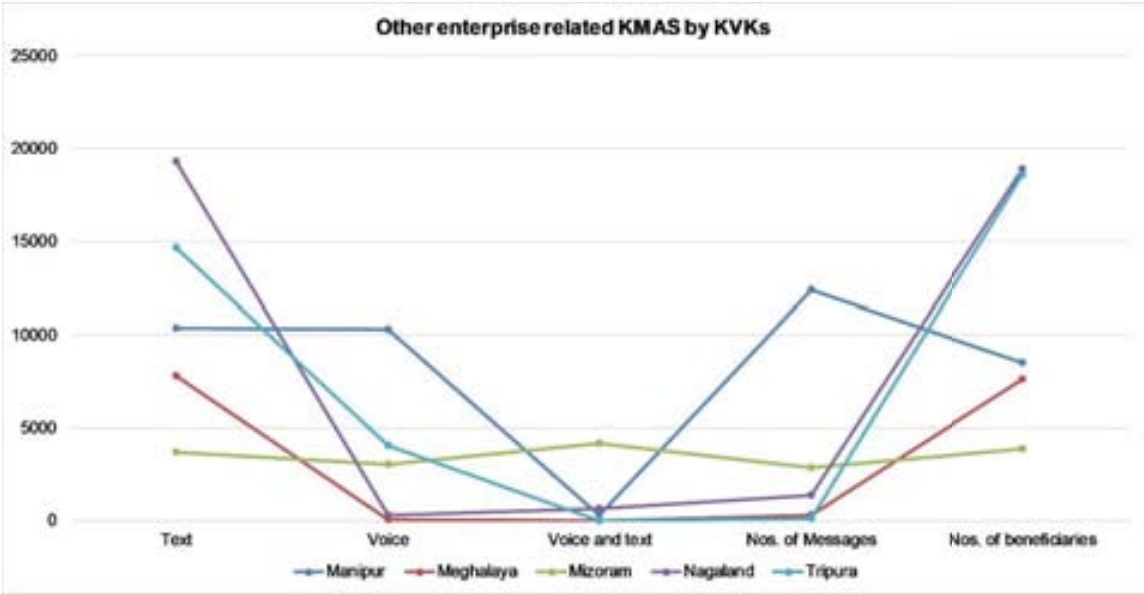
Awareness creation related KMAS



It is seen from the graph that with reference to the number of texts Nagaland (30981) had the highest and Manipur (7310) had the lowest nos. of texts during the years 2011-19. With reference to voice type, Manipur (12476) had the maximum and Nagaland (114) with least nos. of voice type. With reference to both voice and text type, Mizoram (2900) had the highest and Tripura with none. With reference to number of messages and number of beneficiaries, Mizoram (8580) had the highest nos. of messages and benefitting 11612 nos. of farmers and Tripura (119) with the least nos. of messages benefitting 18593 nos. of farmers. Moreover, the KVKs of Nagaland state reached to 30599 farmers through 30981 text messages.

Other enterprise related KMAS

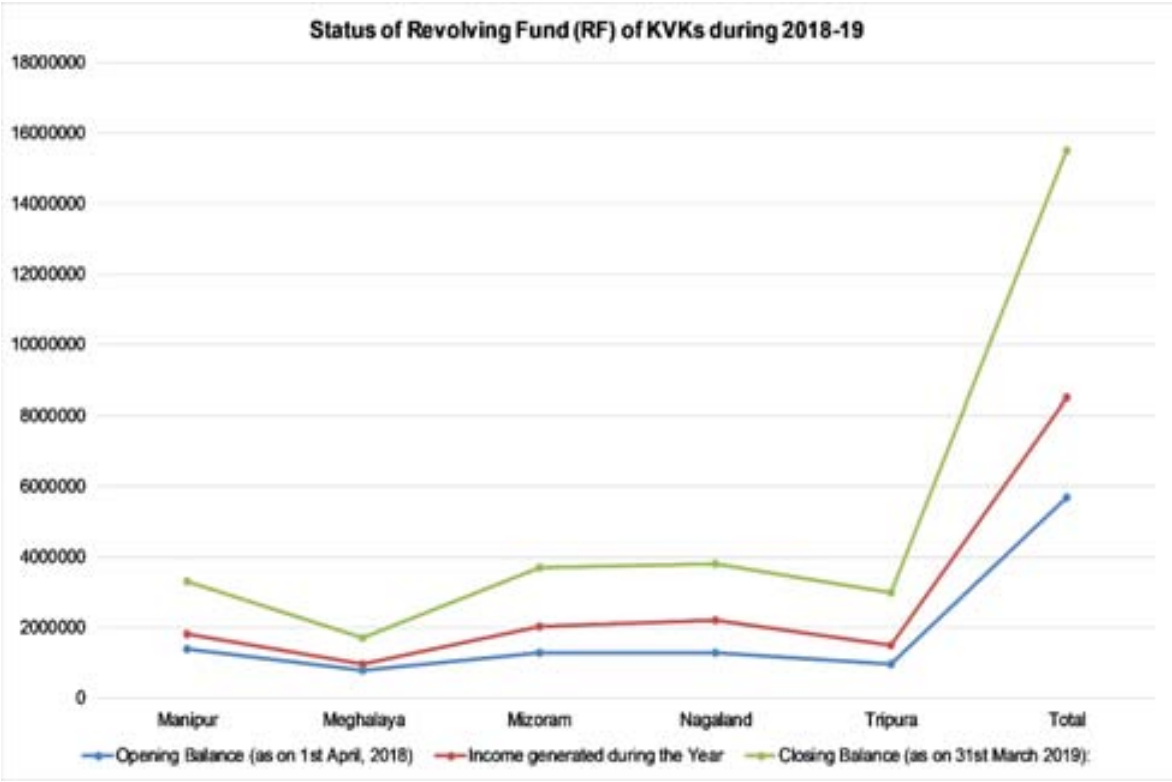
It is seen from the graph that with reference to the number of texts Nagaland (19312) had the highest and Mizoram (3685) had the lowest nos. of texts during the years 2011-19. With reference to voice type, Manipur (10298) had the maximum and Meghalaya (52) with least nos. of voice type. With reference to both voice and text type, Mizoram (4142) had the highest and Tripura with none. With reference to number of messages and number of beneficiaries, Manipur (12387) had the highest nos. of messages and benefitting 8503 nos. of farmers and Tripura (96) with the least nos. of messages benefitting 18592 nos. of farmers that is maximum in this category.



Status of revolving fund

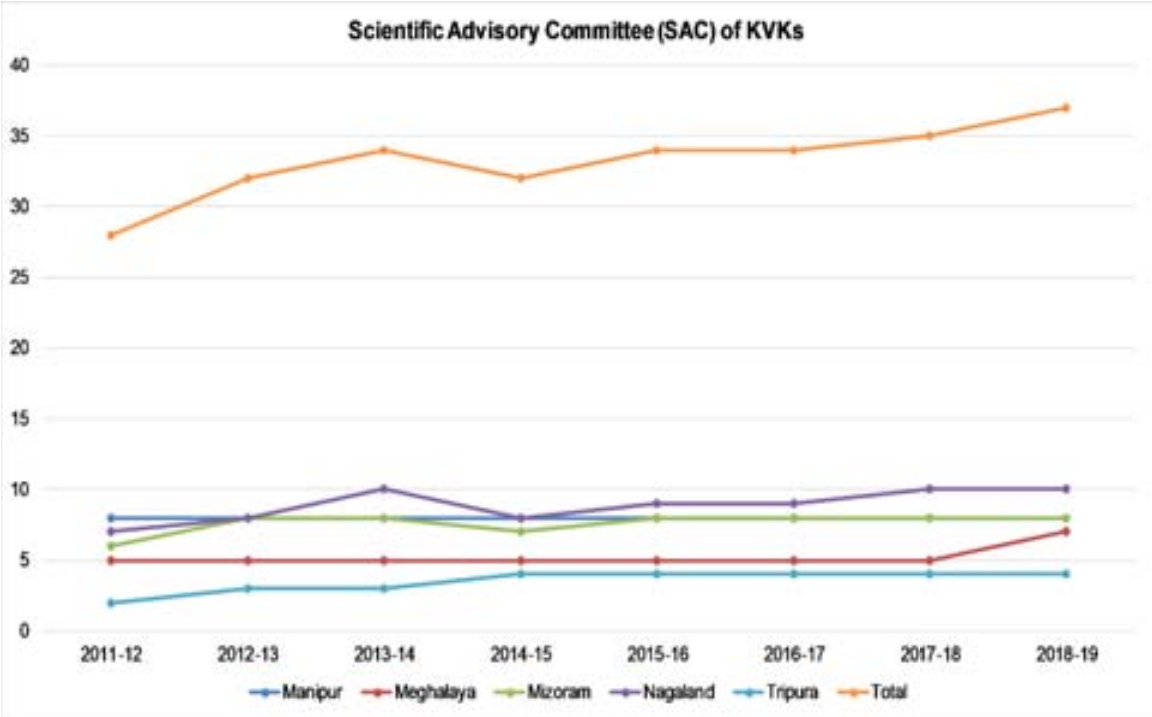
The figure below reveals that a total of Rs.56,93,267.14 was reported by KVKs as the opening balance and generated income of Rs.27,97,471.14 during the years 2011-18 with the closing balance of Rs. 70,01,329.14 by the end of March, 2018.

State-wise status of revolving fund reveals the Manipur had an opening balance of Rs.13,77,392 followed by income generated Rs. 4,40,843 and a closing balance of Rs. 15,05,826. Meghalaya was reported with an opening balance of Rs.7,95,968 followed by income generated Rs. 1,63,832.14 and a closing balance of Rs. 7,61,411.14. Mizoram was reported with an opening balance of Rs.12,69,931 followed by income generated Rs. 7,54,645 and a closing balance of Rs. 16,59,343. Nagaland was reported with an opening balance of Rs.12,75,859 followed by income generated Rs. 9,25,528 and a closing balance of Rs. 15,87,989.Tripura was reported with an opening balance of Rs.9,74,137 followed by income generated Rs. 5,12,623 and a closing balance of Rs. 14,86,760. It is quite clear from the graph that KVKs of Mizoram and Nagaland are much better in utilizing their revolving fund and generating profits.



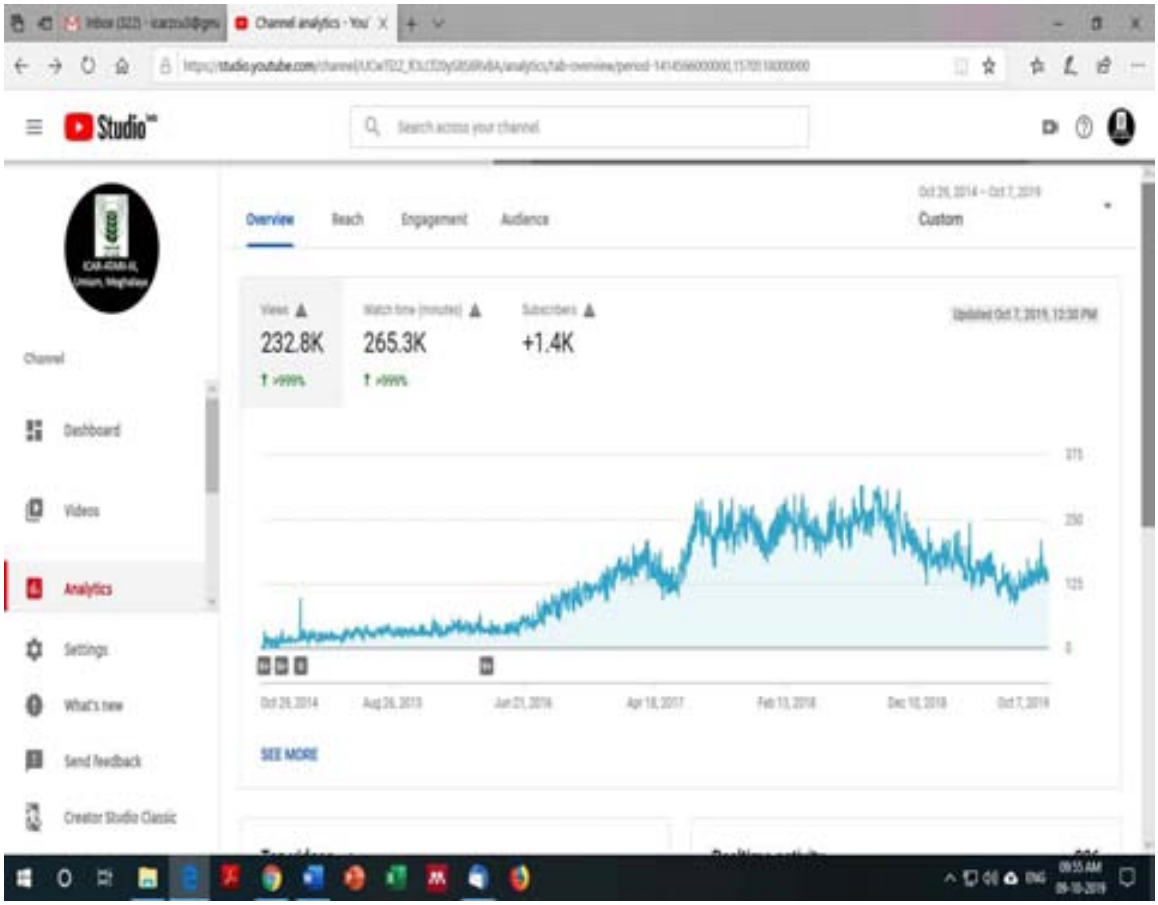
Scientific Advisory Committee (SAC) of KVKs

The graph reveals that a number of SAC was increased over a period of time irrespective of states even though the numbers of SACs to be conducted are bit less than the expected target. Manipur conducted 8 meetings per year, Meghalaya with 5 meetings per year, Mizoram with 6-8 meetings per year, Nagaland with 7-10 meetings per year and Tripura with 2-4 meetings per year. It is evident from graph that KVKs of Nagaland, Mizoram and Manipur are regularly organizing SAC meetings. In general, since 2014-15, number of SACs conducted in Zone-VII are regularly increasing.



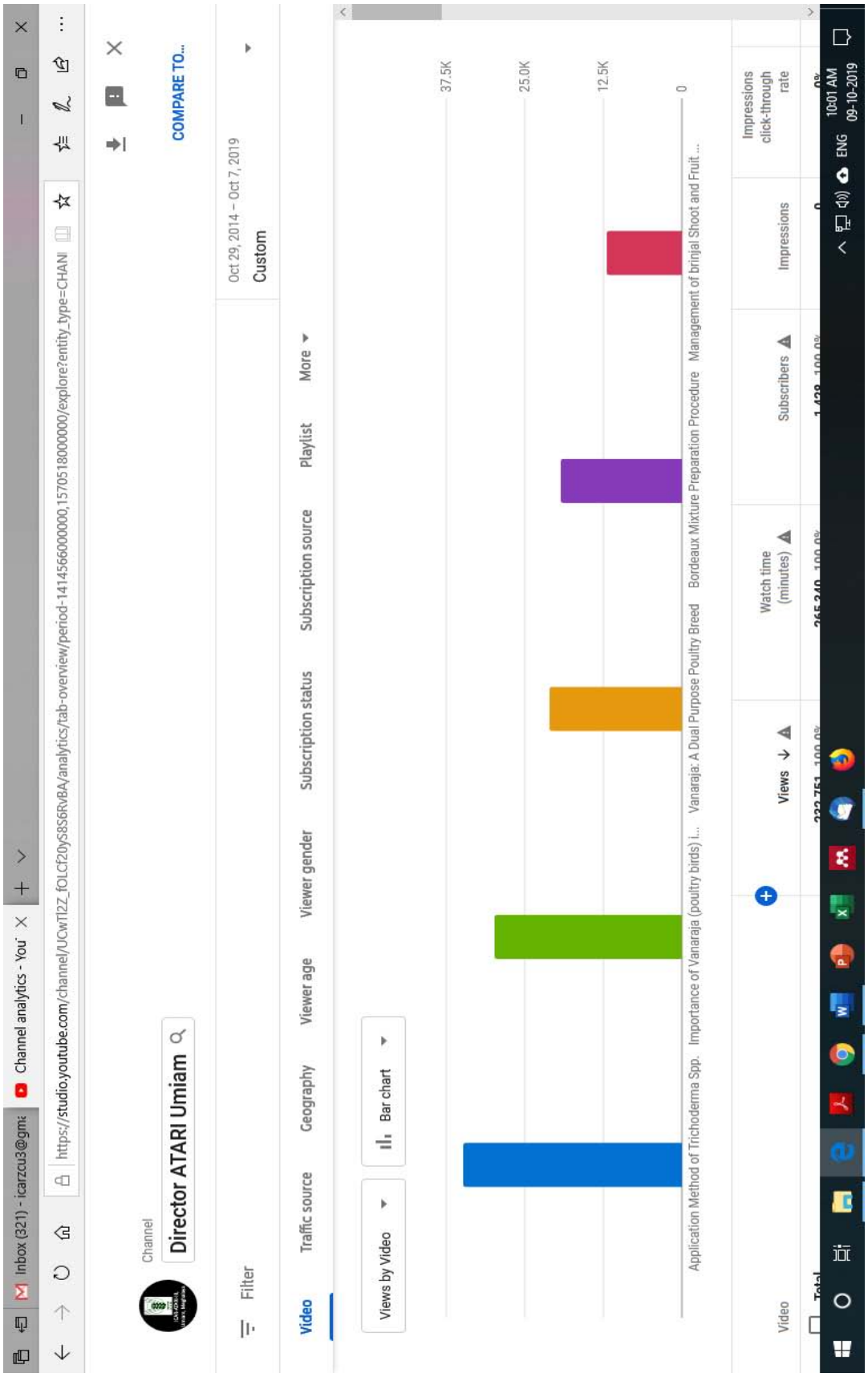
Outreach through ICTs

One of the salient recommendations of previous QRT was to enhance the use of ICTs for spreading scientific information to the rural masses. In accordance with this recommendation, ICAR-ATARI, Umiam trained scientific and technical staff of KVKs on documenting scientific activities and their spread through mainstream media. State wise and discipline wise training programs were arranged, and several videos were produced as an outcome of training. These videos are informative in nature and most of them were produced in vernacular (local) languages.



In addition, these videos were uploaded on the YouTube channel of ICAR-ATARI, Umiam for the benefit of wider audience. Since 2014 videos were available online for viewing across the world. As of now (on 9.10.2019) more than 232000 views are received for 85 videos. More than 1400 individuals have subscribed our institute channel and still hundreds of people regularly watch our videos.

This initiative of ICAR-ATARI, Umiam helped the institute to reach more than 232000 viewers with scientific message.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Importance of Vanaraja (poultry birds) L...
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Management of brinjal Shoot and Fruit ...
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Linkages and Collaborations

The KVKs under ATARI Zone-VII are maintaining strong enabling, functional as well as diffusion linkages with different stakeholders including their host institutes, all line departments of their respective state governments and farmers of the respective districts in matters related to implementation of their mandated and other collaborative programmes. KVKs have also close coordination with other agencies including NGOs and other public and private sectors. KVKs are directly involved in preparation of SREP of ATMA districts and in implementation of various schemes like Mission for Integrated Development in Horticulture, NREGS, SGSY, RKVY etc. Sr. Scientists & Heads and Subject Matter Specialists of KVKs also acted as resource persons for different collaborative HRD programmes sponsored by different organizations such as Assam Agricultural University, Cental Agricultural University, ICAR Research Complex for NEH Region, DRDA, NABARD, ATMA including HRD programmes organized by ICAR-ATARI, Zone-VII.

For different collaborative programmes and activities related to mass awareness and dissemination of latest technologies to the farmers, KVKs under ICAR-ATARI, Zone-VII established strong linkages with:

1. IFAD
2. IWMI, New Delhi
3. ILRI, New Delhi
4. National Fisheries Development Board (NFDB), Hyderabad
5. PPV &FRA, New Delhi
6. MANAGE, Hyderabad
7. Agricultural Skill Council of India (ASCI), New Delhi,
8. Administrative Staff College of India, Hyderabad
9. ICAR-IARI, New Delhi
10. ICAR-IASRI, New Delhi
11. ICAR-NIAEPR, New Delhi
12. ICAR-CIAE, Bhopal
13. ICAR-Directorate of Groundnut Research, Junagadh
14. ICAR-IIMR, Ludhiana
15. ICAR-NBPGR, New Delhi
16. ICAR-IIHR, Bengaluru
17. ICAR-NBAIR, Bengaluru
18. ICAR-NAARM, Hyderabad
19. ICAR-VPKAS, Almora
20. ICAR-NCIPM, New Delhi
21. ICAR-CIFRI, BARACKPUR
22. ICAR-CIFA, Bhubneswar
23. ICAR-Directorate of Cold Water Fisheries, Bhimtal
24. ICAR-IIPR, Kanpur
25. ICAR-CCRI, Nagpur
26. ICAR-IISR, Kozikode
27. ICAR-CTCRI, Thiruvananthapuram
28. ICAR-Directorate of Mushroom Research, Solan
29. ICAR-CPCRI, Kasargod
30. ICAR-NRC on Mithun
31. ICAR-NRC on Pig
32. ICAR-Directorate of Poultry Research, Hyderabad
33. ICAR Research Complex for NEH Region, Umiam
34. CAU, Imphal,
35. AAU, Jorhat,
36. NERIWALM, Tezpur
37. NABARD
38. ATMA

Salient success stories from the KVKs of ICAR-ATARI, Umiam

Rice-Fish Culture: A new dimension of farming in Meghalaya

Introduction

In recent years, many farmers shows keen interest in fish culture and hence, construction of ponds came up in many feasible areas but sadly, there are also many farmers who convert their productive paddy fields into fish ponds since most of them have no choice as they are small land holders. Even though many farmers take up fish culture, yet there is no encouraging results in terms of productivity and profitability due to poor management, lack of technical knowhow and also because they cannot afford to buy fish feed (rice/ wheat bran and mustard oil cake). Integrated Farming Systems hold special position as in this system nothing is wasted, which can also help poor small farmers who have very small land holding to diversify farm production, reduce input cost and exploitation of unutilized resources.

KVK Intervention

Integration of fish in the feasible paddy fields is the best option for those who do not have land for pond construction. Front Line Demonstration (FLD) on integrated rice-fish farming was therefore conducted by the KVK West Khasi Hills at Nonglwai village in the paddy field of Smt. Sketina Kharbani, a progressive farmer from the District. Her paddy field was modified by digging canals or trenches of 0.5 - 0.6 m deep and 1 m wide connecting (intersect) to the small central sump in the middle of the field. The dykes had been elevated and installed with inlet and outlet protected with fine screening. Fencing with netting material was also done at the lower part of the field to prevent fish from escaping during heavy rains. Local rice variety (ba lwai) was transplanted when the field is ready. After two weeks of transplantation, fingerlings of Common carp (main species), silver carp, gonius, etc were stocked @ 6000 nos. per hectare of paddy area. Minimal feed were given with rice bran and mustard oil cake in the ratio of 1:1. Liming and manuring were also done regularly.

Output & Outcome

Before intervention, the yield of paddy was about 15 q/ha but after intervention, the yield of paddy enhanced to 20 q/ha and what is more interesting, she also got fish from the same plot. The yield of fish from the paddy field was 500 kg/ha. According to her, this

technology is very simple and low cost with high economic return. The increase in rice production is also a result of stocking fish (common carp as the main species) as a component of integrated pest management. Due to the integration of fish in the field, use of pesticides is completely stopped. But there are also difficulties because many paddy fields are not feasible for fish integration due to the hilly terrain that restricts the size of the field. 1 ha of paddy field having different form and size of trenches (Average: 0.5 m deep and 1 m wide) with common carp as the main species gave a net profit of Rs 70,315.

Impact

The technology is gaining acceptance not only in Nonglwai village but also in other villages because of the simplicity of the technology and improved production. Now rice-fish culture in the district is a regular cropping practice in many of the villages in the district.

Black Polyethylene Mulch: A boon for Pineapple cultivation in Nagaland

Introduction

Pineapple (*Ananas comosus*) is one of the important fruit crops of Dimapur district of Nagaland occupying the total area of 3700 ha with a production of 57,500 t with the average productivity of 15.54 t/ha. In Dimapur district of the state pineapples are grown in hillocks with the slope of 30-40% as beyond that soil erosion is very high during rainy season and experienced moisture scarcity during winter. Prior to KVK intervention, pineapple was cultivated at single row spacing of 1 meter square along the slope for the ease of weeding in an area of 5-6 hectare in Molvam village, Dimapur. In this system of planting the productivity of the crop is very low with higher level of soil erosion.

KVK Intervention

The KVK, Dimapur organised hands on training on pineapple cultivation during 2002 with the latest technology of double row spacing @ 90 x 60 x 30 cm3 across the slope to accommodate plant population of 44,500/ha. The KVK in collaboration with the Department of Horticulture, Govt. of Nagaland and CIH, Medziphem worked hand in hand to popularize double row spacing in pineapple during 2006-12. The farmers' income of the village increased significantly during the period. However, farmers were looking for some technology to reduce the cost of weeding. Therefore, in 2013-14, KVK Dimapur under TSP programme introduced black polythene mulching in pineapple and the mulch materials having the thickness of 50 µ were provided to the farmers of Molvam.

Output & Output

With the introduction of double row spacing, the area under pineapple had been increased to 520 ha in Malvom village during 2014-15 with or without mulching. The use of black polythene mulching not only suppressed the weed growth but conserved the soil moisture, which leads to early flowering in mulch plot by 6-7 months i.e. flowering started after 9-10 months of planting in Jan-Feb where as in control the flowering was observed only after 15 months of planting in September. First year nearly 7.5-10% plants only flowered. Next season nearly 50% plants flowered. Soil moisture was conserved by polythene mulch which could produce the double size fruits. The average fruit weight was recorded 2.1 Kg/fruit under polyethylene mulch with an average productivity of 750 q/ ha compared to 1.2 kg/ fruit in control plot with average productivity of 400 q/ ha.

Impact

Pineapple cultivation with polythene mulch has been gladly accepted by the farmers as this technology has reduced the cost of weeding in subsequent years although the initial cost of cultivation i.e. laying of black polythene sheet and labour cost @Rs 1,85,000/ha was high. Now, the pineapple cultivation with black polythene mulch with double row spacing i.e. 90 x 60 x 30cm having plant population of 44500/ha is gaining popularity in many of the villages of Nagaland.

Beehive Briquette as an Eco -Friendly Bio-Fuel for Rural Cooking

Introduction

The excessive and unregulated use of fuel wood for house hold cooking, space heating and wood based rural industries have led to the destruction of Manipur's forests leading to serious ecological and environmental consequences. Time has come to reduce the consumption of fuel wood by substituting it with the efficient utilization of agroresidues and forestry wastes. Beehive briquettes may be an alternative to fuel wood in the rural areas. The beehive briquette is a circular shape briquette having multiple holes made from char and clay mud mixed in certain proportion. Due to the holes, it looks like beehive, thus the name came Beehive Briquette. Dried beehive briquette produces smokeless burning for 3.0 to 3.5 hrs. It can be burnt in the metal *Chulha* (*Meiphu*) or even in the *Moreh Chulha*. It can be used for cooking, boiling of water and heating. The calorific value of this briquette is approximately 18-20 MJ/kg.

KVK intervention

There are more than 30 numbers of brick farm under Lamsang Sub-division, Imphal West district, Manipur and huge amount of charcoal are removed everyday from these brick farms. These charcoals are not economical to use for heating or burning, but the same charcoal can be used for briquette making. Therefore, KVK, Imphal West organised a training programme on briquette making in its campus and trained more than 25 persons during 2012. Mr. Lamdeng Mayai Leikai after attending the training programme had shown his interest for initiating a small enterprise on briquette making. Thereafter, he took one week hands on training on briquette making in the KVK and started his enterprise in 2013.

Output & outcome

In the beginning Mr. Leikai started his enterprise by himself with the support from family members and started producing 150 to 200 briquettes per day in the peak demand period during November to March. Now he is producing 500 to 600 briquettes per day and his average income is Rs. 60000 per month. This small enterprise has not only helped him earning for his family but also gave employment to 4 lady workers of his village

Impact

Now more than 20 farmers from different villages of Lamdeng, Khonghampat, Sangaithel, Khabi Bamdiar, and Kiyam village under Lamsang block, Imphal West

district, Manipur have started manufacturing beehive briquettes and earning their livelihood. The case study on beehive briquette revealed that it can save huge amount of natural resources and act as an alternative to fuel wood besides providing employment opportunities to rural youth.

Integrated rice cum fish cum duck culture in Namsai, Arunachal Pradesh

Introduction

Namsai District of Arunachal Pradesh is endowed with rich natural fisheries resources in the form of ponds/tanks, bills, swamp, low laying areas and diverse network of rivers. Namsai district received heavy rainfall varies from 110-3645 mm and distributed round the year, however least rainfall is received in the month of January. Temperature varied from 5 to 36oC. Though, climatic and topographic condition is most suitable for integrated farming system however, rice based mono cropping agriculture is most prevalent activity of rural farmers. Rice is grown in 11654 ha with an average yield of 26q/ha due to least use of fertilizer and pesticides.

KVK Intervention

To improve the production and maximize the utilization of natural resources, KVK Namsai, conducted demonstrations on 'Integrated rice cum fish and duck culture' at farmers field of different village of Namsai District. Under the demonstration, a 5 days training programme were conducted. During the training programme, the farmers were involved in each and every step of the demonstration where they learned the scientific management practices of fisheries *viz.*, preparation of scientific fish pond, selection of cultivable fish species, fish disease management, application of lime and management aspects. Preparation of fish pond and management of duckling, ducks and construction of house at bank of pond were also demonstrated during the training programme.

Output & outcome

Sl no	Particulars	Before intervention		After Technology introduced	
1.	Rice (Bihari/ Ranjit)	3.5 ton / ha	Rs. @9/kg = 31,500/	6.0 ton/ha	Rs. @9/kg = 54,000/
2.	Fish (IMC)/grass carp/ common carp	nil	-	500kg/	Rs. @130/kg = 65,000/
3.	Duck- Khaki Campbell	nil	-	Duck meat- 100kg And egg- 800 nos.	Meat Rs. 100/kg = 10,000/ And egg Rs. @10/pc = 8,000/
	Total Income	-	Rs. 31,500/	-	Rs. 1,37,000/

The knowledge gained from the demonstration had helped the farmers to raise the productivity of the existing pond in the village. Earlier there was no such type of practice throughout the district. The following table indicates the output of the integrated rice-fish-duck farming as against the mono culture of rice.

Impact

During 2016-17, the farmers of Khowji, Guhaingoan villages of Lekang circle and Sengsap village of Namsai circle continued the 'Integrated rice cum fish and duck culture'. Looking into the higher income of the system the farmers of six more villages have come forward to adopt this technology.

Innovative farmers the KVKs of Zone-VII

Honey cure- New ray of hope

Background

This innovation is the rare of its kind started by T. Chuba, a progressive farmer in Yisemyong village of Mokokchung district in Nagaland. Located at an altitude of 1050 m above msl, is an ideal spot for apiculture. This innovation also cuts short the medication cost of the villagers especially for the treatment of urine problem, blood pressure, liver tonic and upset of stomach which are the major health issues faced by the villagers due to unhealthy food and living habits.

Farmers Profile

Name: **T. Chuba**
Education level: **VIII Passed**
Address: **YisemyongMokokchung**
Mobile number: **9856551527**
Aadhar No**. :741027774117**
Size of land holding: **2 ha**

Methodology

Queen cells: The honey combs are first melted in a small pot. It is then allowed to cool down till the liquid form becomes little solidified. Then a small stick is dipped into the half-solidified comb which is immediately removed and dipped again into a bowl of cold water and shaped into small cells.

Placement of cells in the bee box: The prepared cells are then fixed into a small board and hanged upside down inside the bee boxes. The bees start to lay eggs inside the cells and start a colony.

Candles: The honey combs are melted and filled into small pipes along with a thread and after cooling it off it is removed from the pipes.

Honey cure: It is a medicine prepared from honey. 1 bottle pure honey + 1 bottle water + 10 gms yeast are put in a clean pot. 12 hours after stirring it thoroughly, cover the pot and leave it. Again after 12 hours stir the mixture again. This procedure continues for 1 month and stirring is done after every 12 hours. Froth appearing during stirring should not be removed/discarded. After 1 month, filter the mixture and store it in a clean glass bottles. The best time for preparation of this medicine is during May, June and July.

Stingless bee honey extraction: The bee boxes are kept in a stool like structure in an inclined position. The honey combs are then crushed with a clean knife and allowed to seep down through a hole at the bottom of the box. The honey is collected in a bowl kept below the box.

Outcome/ Impact

- Total management cost : Rs. 90,000 per year
- Total income : Rs. 2,80,000 per year
- Net return : Rs. 190000
- B:C ratio : 3.1

The farmer has gained a lot of knowledge on apiary and hence he has started giving training and demonstration through which fellow farmers and officials are getting the knowledge of apiary.

Use of rice husk for enhanced water saving

Background

Poly houses are completely devoid of rain and so cultivation of crops inside polyhouse is very difficult without irrigation. Moreover, retention of moisture for more than 2-3 days is very difficult due to higher temperature inside. To find a solution to this problem, SapamLukhoi Singh, a progressive farmer from Thoubal, district of Manipur came up with a new innovation of using rice husk in order to enhance water saving in polyhouses**.**

Farmers Profile
Name: **Sapam Lukhoi Singh**
Age: **45 yrs**
Education level: **Secondary**

Address:
Village: Wabagai Thingel Leikai
Block: Kakching
District: Thoubal/ Kakching
Mobile number: **700563703**
Aadhar No**. :5368953691996**
Landholding: **0.75 ha.**

Methodology

Use of rice husk filled in the 2 inch wide, 2 inch deep furrows/channels between plots for longer retention of water for different crops grown in sequential manner - 1st , Mustard sown as trap crop for cabbage and cauliflower nursery particularly for flea beetle; Crop rotation –cabbage and cauliflower nursery for sale as well as for self - capsicum - cucumber- local garden pea as relay and sequential crops

Outcome/ Impact

- **Very profitable, good for Intensive land utilization**
- Gross income from one year-**Rs.183300.00/500 sq m**
- Cost of cultivation **– Rs. 15500.00**
- B:C **= 11.8**

Innovative Egg laying cabin

Background

Meghalaya in general and East Khasi Hills district in particular has a favorable weather for rearing of poultry birds but, the farmers have the problems in setting up of a well defined and scientific poultry layer farm due to higher cost. In the locally adopted method, the layer birds lay eggs scattered in the open hard floor resulting considerable losses. Such losses included scattered egg laying, spoilage of eggs due to breakage (50% losses) and high mortality of layer birds. Furthermore, most of the laying birds are pecked by other birds which resulted in infections and dying of the birds. To address this problem, Shri WallamkuparLyngrah, a progressive farmer from East Khasi Hills district developed an innovative egg laying cabin.

Farmers Profile
Name: **Shri Wallamkupar Lyngrah**
Age: **45 years**
Education level: **Graduate**
Address: Village Mawsiatkhnam
PO- Mawlai Phudmuri
BPO- Mawtawar, 793022 Meghalaya

Mobile number: **8787565664**
Aadhar No. : **823485036596**
Area: **4.94 acres**

Methodology

The farmer observed that the birds are fond of laying eggs on corners and where there are darker shades. Realizing this, the farmer constructed the laying cabins which attracted the birds for laying their eggs. A specific dimension was maintained in the cabins which allowed the birds to freely lay their eggs without any disturbance from other birds due to low light and lesser height. The floor of the laying cabin was laid with saw dust which prevents breakage of eggs (0% losses due to breakage) during laying and a provision for collecting the eggs were provided in the form of hinged top covers so as to facilitate easier collection of eggs from outside without entering the poultry shed. By adopting this method the farmer could increase the production of eggs from his farm and at the same time could minimize the death of birds.

Outcome/ Impact

- Gross income= **Rs 8,76,000/-**
- Net income = **Rs 7,09,140/-**
- Cost of cultivation **= Rs 1,66,860/-**
- B:C ratio= **5.2**

The method adopted by the farmer involves low additional investment cost along with high productivity and low mortality rate of the birds, which makes it economically more viable. 80 -90 % increase in the productivity level with the adoption of the modified housing structure is observed since adoption. On an average, the modified technology adopted by the farmer reduced the spoilage or loss of eggs by 90%.

The new technology adopted by the farmer is being practiced by him for the past 3 year and is still performing well. Some fellow farmers who own poultry sheds are attracted by this new innovative idea and have adopted this innovation in his Village and nearby villages of the district.



Earning livelihood through piggery in an innovative way

Background

Nagaland being a tribal state, there is a huge demand of meat and meat products. The amount of meat produced is insufficient to meet the demands of the people and therefore there is a huge import from the neighboring state like Assam. However, with the banned imposed by youth organization to import piglets into the District from outside, there has been huge demand of quality piglets particularly in Phek district of Nagaland. In order to meet the deficit market, Mrs Kuhukhrulu Khamo, a progressive farmer of this district has started an innovative way of piggery farming.

Farmers Profile
Name: **Mrs Kuhukhrulu Khamo**
Age: **39 Years**
Education level: **Cl. VIII Passed**
Address: **Rikuzu Colony, Pfutsero, Phek.**
Mobile number: **08974100870**
Aadhar No**. :228141096100**

Methodology

Feeding of the pigs with concentrated ration (Wheat bran, Broken rice & Dry fish) and selective green leaves from jungle in the ratio 2:1 and has achieved the desired growth rate. With the income generated she has purchased a vehicle to transport quality boar to the cyclic sow to the nearby villages (viz Phuchasadu, Porba, Pfutseromi, Thipuzumi, Rikuzumi) on payment basis (Rs 1000/- per service excluding the transportation charge). She sells her piglets @ Rs 5000/-

Outcome/ Impact

B:C ratio= 2.37 (Total income from sale of piglets and boar service is approx. 6 lakhs per annum and input expenditure 2.53 lakhs that includes feeding, healthcare, depreciation etc.). The innovative method of feeding has reduced the expenditure which account to 70 percent of the investment in pig rearing. Further, the fellow farmers are greatly benefited by the boar service in quick and timely manner that assures impregnation of the sows.




Wooden Tool for double row method of TPS to tuberlet potato production

Background

In Tripura, agro-ecological farming situation is sub Hot sub-humid (moist) to humid areas with average rainfall of 2200 mm. and problem is Difficulty in preparation of lines in between rows for TPS sowing with proper seed depth under double row method of sowing which need huge farm labour and high cost of cultivation. Normal line making by stick without open furrows reduced germination percentage and there is huge labour requirement. To overcome this problem, Sri Mohan Sarkar a progressive farmer from SulanalaNarayanpur village of North Tripura district developed a wooden tool for tuberlet potato production.

Farmers Profile
Name: **Sri Mohan Sarkar**
Age: **59 years**
Education level: Secondary
Address: **VIII- Sulanala Narayanpur, Patcherthal, Unakoti (Undivided North District)**

Mobile number: **09436340729**
Aadhar No**.** **: 5969 4359 0507**
Area: **4.8 acres**

Methodology

Sri Mohan Sarkar S/o late Nilkanta Sarkar of Patcherthal has developed one implement for easy sowing of true potato seed (TPS) with appropriate lines having proper seed depth. He developed the wooden implement (tool) with 12 cm gap between two rows for proper seed depth and for TPS to Tuberlet production the spacing maintained was 12 cm X 4 cm X 25 cm (Row to row – 12 cm (5 inch), two row to two row – 25 cm (10 inch) and Seed to seed – 4 cm (1.5 inch) instead of recommended Spacing = 10 cm X 4 cm X 25 cm. This tool makes open furrow for seed sowing and these furrows are kept opened till seedling height 5 cm. Furrows facilitates accumulation of drops of foggy drops resulted higher germination percentage because germination of tinny seeds is one of the major problem TPS cultivation and seeds depth should be within 0.5 cm.

Development of this particular tool with 1 inch increased in the spacing between two rows benefited for intercultural operations specially weeding by means of manual or hand weeding. It also helps for earthling up operations in between the rows with **No** any yield and size of tuberlet variation. Other cultivation practice remains same. This tool really reduce the cost of cultivation as lines making for seed sowing in between rows became easy and required less labour. Farmers adopted this simple but effective

technology/ toll and reduced the labour cost upto Rs 20,000.00/ ha because individual line making is no more required by manual labour.

Outcome/ Impact

Economics of normal practice- **Cost of production (per ha.) – Potato (Tuberlet) - Rs 84703.00**, Avg. production (per ha.)- 22 mt , Avg. market price of tps tuberlet potato (Rs/ Kg.)- 10.00, Gross return- 220000.00, **Net return- 135297.00**, **B:C ratio – 2.6:1**	Economics/Profitability of innovative practice **Cost of production (per ha.) – Potato (Tuberlet)- Rs 64703.00**, Avg. production (per ha.)- 22 mt , Avg. market price of tps tuberlet potato (Rs/ Kg.)- 10.00, Gross return- 220000.00, **Net return- 155297**.00 **B:C ratio – 3.4:1**

Initially making of lines and bed preparation was major problem due to labour shortage and low germination percentage. This farmer has developed this simple tool which benefited the entire village farmers for adoption of this tool and now this village is known for best village of TPS to Tuberlet production. This tool has been adopted by the other villages during trainings, field days etc.

Black Pepper for poor soil fertility and water stress areas

Background

In Meghalaya particularly West Garo Hills district, Problem of low soil fertility status and moisture stress/loss during rabi season reduces the yield of crop up to 50%. To cope up with this problem, Shri Wovel Dkhar, a progressive farmer of Robagre village in West Garo Hills district started black pepper plantation to enhance the soil fertility.

Farmers Profile
Name: **Tohovi Chishi**
Age: **55 years**
Education level: **Secondary**
Address**: Littami New Village,**
V.K. Town, Zunheboto, PIN- 798601
Mobile number: **8731801324**
Size of land holding: **19.76 (acres)**

Methodology

In his new innovative practice, Shri Dkhar observed that four years and above old plants starts producing new shoots near the base and grows laterally in the ground developing new roots at every nodes until they found any support to climb upon. When the new shoot climbs into the same support plant and attains a height of around 5ft with 4 and above nodes, he carefully remove the shoot from the support tree, diverts by placing the plant inside the soil at a depth of 15 cm so as to protect it from cattle and other livestock and thereby lifting the other side above the ground and allow it to climb in another support plant. Some fine loamy soils and partially decayed soft woods are put near the base of the support plant. After the root is well developed and climbs on the support, the plants are detached from the mother crown.

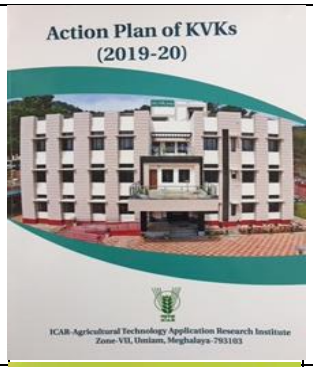
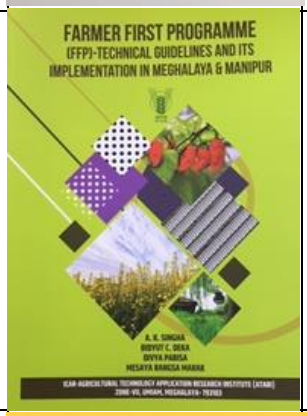
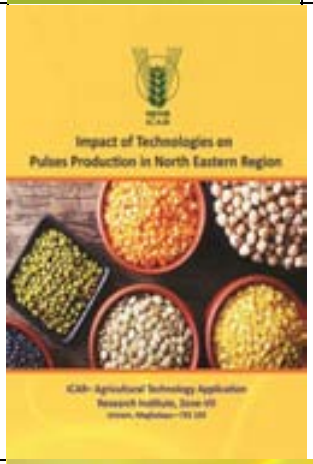
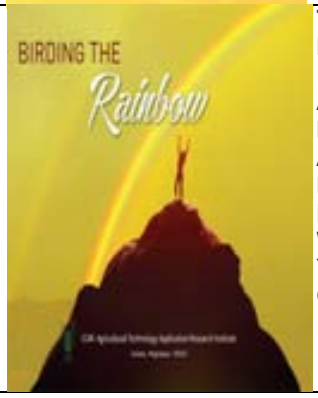
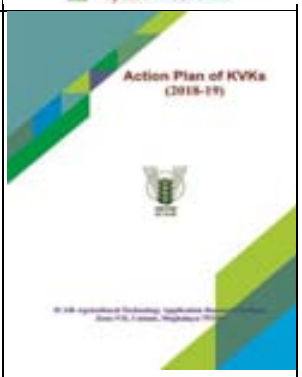
In every base of each crown of black pepper plant, he put some soils and decayed soft woods thereby conserving moisture during dry spells as well as supplies nutrient to the soil after decomposition as humus. He also utilize the empty half litre mineral water plastic bottle by making small holes in the cap and tied upside down in the support plant just above the base of black pepper plant for regular supply of water to the crop during the dry spell months. He constructs one dairy, one piggery and one poultry unit in the middle and top portion of his farm for additional supply of nutrients and organic manure to the soil.

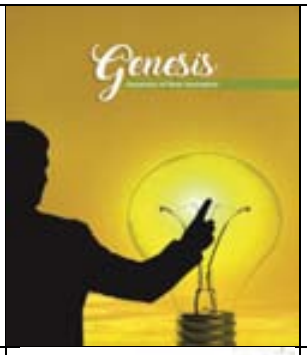
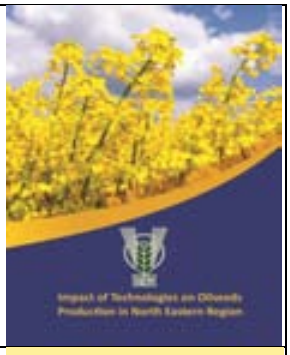
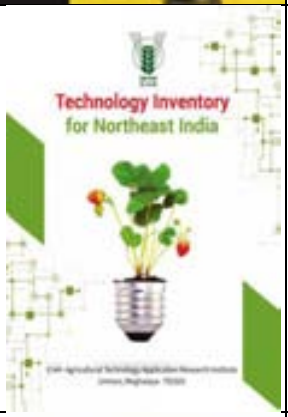
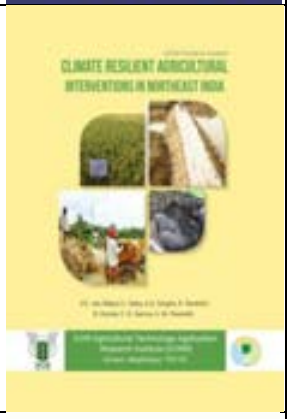
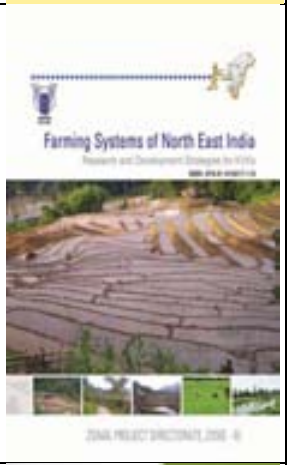
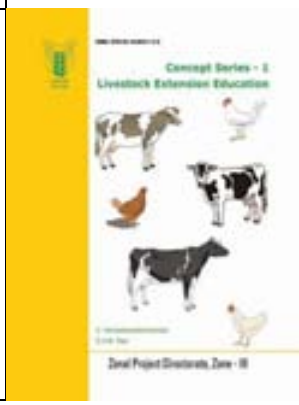
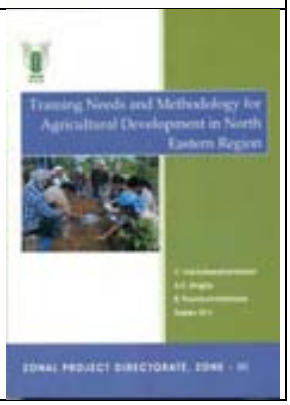
Outcome/ Impact

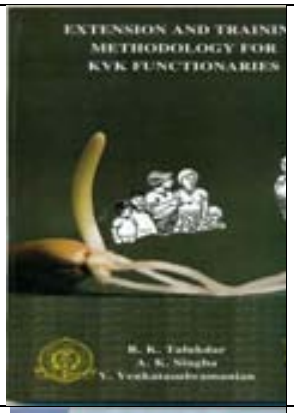
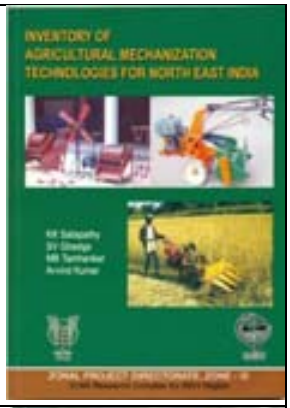
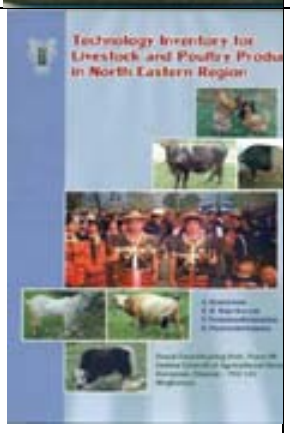
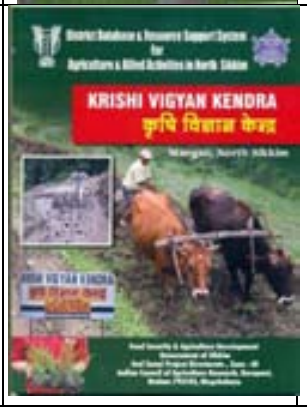
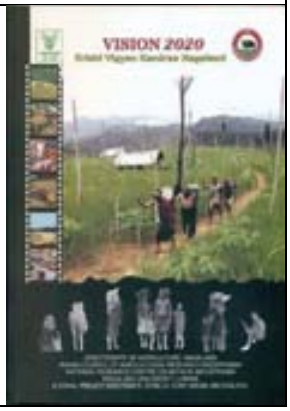
An average yield of 11.78 q/ha was recorded which fetched a net return of Rs.1,36,510/-ha with a B:C of 3.45.

This innovative idea of Shri Dkhar, came into light to the scientist during a farmers scientists interaction programme held at KVK, West Garo Hills. His innovation to conserve moisture and enhance the soil fertility got disseminated to the nearby adjacent villages and moreover he also interacts with other farmers from different villages regarding the innovative production of black pepper during any programmes organized by KVK, State Dept. and NGO's.

Publications by ICAR-ATARI, Zone VII

Title: Action Plan of KVKs. **Authors:** Bidyut C. Deka, A.K. Singha, Divya Parisa, Mesaya Rangsa Marak, Careen Nongrum, Ophilia Mawlong, Azriel Mervin Tariang Anik Lyngdoh		**Title:** Attracting and Retaining Youth in Agriculture (ARYA)-Proper Guidelines and its implementation in Manipur, Nagaland and Mizoram **Authors:** Bidyut C. Deka, A.K. Singha, Divya Parisa, Mesaya Rangsa Marak, Anik Lyngdoh	
Title: Farmer First Programme(FFP)-Technical Guidelines and its Implementation in Meghalaya& Manipur **Authors:** Bidyut C. Deka, A.K. Singha, Divya Parisa, Mesaya Rangsa Marak,		**Title:** Technologies For Doubling Farmers' Income in NEH Region. **Authors:** Bidyut C. Deka, Divya Parisa, A.K. Singha, Rimiki Suchiang Careen Nongrum	
Title: Impact of Technologies on Pulses Production in North Eastern Region. **Authors:** Bidyut C. Deka, Divya Parisa, A.K. Singha, Daegal A. Massar Rupaia Siangshai		**Title:** Strategy Document for Doubling Farmers Income in Meghalaya. **Authors:** Bidyut C. Deka, A.K. Singha. M. Mokidul Islam R.Suchiang	
Title: BIRDING THE Rainbow. **Published by:** ICAR-Agricultural Technology Application Research Institute(ATARI), Umiam		**Title:** Action Plan of KVKs. **Authors:** Bidyut C. Deka, A.K. Singha, Divya Parisa, R.Suchiang, Worshim Mahongnao Y.Lyngdoh Ophilia Mawlong	

Title: Genesis - Dynamics of Farm Innovation. **Authors:** Bidyut C. Deka, A.K. Singha. Divya Parisa R.Suchiang		**Title:** Impact of Technologies on Oilseeds Production in North Eastern Region. **Authors:** Bidyut C. Deka, A.K. Singha, Rupaia Siangshai, Daegal A. Massar	
Title: Technology Inventory for Northeastast India. **Authors:** R. Bordoloi, Bidyut C. Deka, A.K. Singha, Bagish Kumar, P.C. Jat, C.K. Sarma, R. Borgohain		**Title:** Climate Resilient Agricultural Interventions in North East. **Authors:** P.C. Jat , Bidyut C. Deka, A.K. Singha. R.Bordoloi, B.Kumar Chinmoy K. Sarma A.M. Pasweth	
Title: Concepts, Approaches and Methodologies for Technology Application and Transfer - A resource book for KVKs.(2nd Edition). **Authors:** V.Venkatasubramanian, Sajeev M.V., A.K. Singha.		**Title:** Farming Systems of North East India - Research and Development Strategies for KVKs. **Authors:** Sajeev M.V. , V.Venkatasubramanian, A.K. Singha.	
Title: Concept Series 1 - Livestock Extension Education **Authors:** V.Venkatasubramanian, S.V.N. Rao		**Title:** Training Needs and Methodology for Agricultural Development in North Eastern Region. **Authors:** V.Venkatasubramanian, A.K.Singha, R.Pourouchottamane, Sajeev M.V.	

Title: Extension and Training Methodology for KVK Functionaries. **Authors:** R.K. Talukdar, A.K. Singha, V. Venkatasubramanian		**Title:** Inventory of Agricultural Mechanization Technologies for North East India. **Authors:** K.K. Satapathy, S.V. Ghadge, M.B. Tamhankar, Arvind Kumar	
Title: Technology Inventory for Livestock and Poultry Production in North Eastern Region. **Authors:** A. Kumaresan, K.M. Bujarbaruah, V. Venkatasubramanian, R. Pourouchottamane		**Title:** Agricultural Technology Inventory for North Eastern Region. **Authors:** U.K. Baruah, N.N. Puzari, P. Nath, R.K. Talukdar, V. Venkatasubramanian, A.K. Singha	
Title: Decision Support System in Agriculture and Allied Sector of Papum-Pare District : Part-I : Krishi Vigyan Kendra, Papum-Pare. **Published by:** Directorate of A.H & Veterinary, Arunachal Pardesh; Zonal Coordinating Unit, Zone-III, Barapani.		**Title:** Technologies for Soil and Soil Fertility Management of North Eastern Region **Authors:** Patiram, T.Ramesh	
Title: District Database and Resource Support System for Agricultural and Allied Activities in North Sikkim. **Published by:** Food Security & Agriculture Development, Govt. of Sikkim ; ZPD Zone-II, Barapani.		**Title:** Vision 2020 - Krishi Vigyan Kendras Nagaland. **Published by:** Directorate of Agriculture, Nagaland; ICAR, Medziphema; NRC on Mithun, Medziphema; Nagaland University, Lumani; ZPD Zone-III, Barapani.	

Annexure 1

List of KVKs of Zone-VII, their host institutes and contact details

State	KVK Name	Host	KVK Address	KVK contact Number	Name of PC\IC
Manipur	Bishnupur	Joint Farming Cum Pisciculture Co-operative Society, Utlou, P.O. Nambol 795134, Dist. Bishnupur, Manipur	KrishiVigyan Kendra, Bishnupur District, Utlou, P.O. Nambol, Manipur-795134	0385-2453444	Dr. R.K. Imotomba Singh
	Chandel	Director, ICAR Research Complex for NEH Region, Barapani.	KrishiVigyan Kendra, Chandel. ICAR Research Complex for NEH Region, Manipur Centre Chandel-795127	9471212014/ 8730077380	Dr. Deepak Singh
	Churachandpur	Director, ICAR Research Complex for NEH Region, Barapani.	KVK Churachandpur, Pearsonmun village, Churachandpur-District, Manipur-795128	8787684165	Dr. Niranjan Lal
	Imphal East	Vice Chancellor, CAU, Imphal, Manipur.	KrishiVigyan Kendra, Andro, Leitanpekpham, Andro, Imphal East District, Manipur – 795 149	9436893710	Mrs. S. Molibala Devi
	Imphal West	Director, ICAR Research Complex for NEH Region, Barapani.	Kh. Hera Singh, KVK, Imphal West, ICAR Research Complex for NEH Region, Manipur Centre, Lamphelpat, Imphal, 795004	0385-2410485,	Kh. Hera Singh
	Senapati	Foundation for Environment & Economic Development Services (FEEDS), Hengbung, P.O. Kangpokpi, 795129 Dist. Senapati, Manipur	KrishiVigyan Kendra-Senapati, Hengbung Village, BPO Hengbung, P.O. Kangpokpi – 795129, Senapati District, Manipur	9774666174	Dr. Nongmaithem Jyotsna

	Tamenglong	Director, ICAR Research Complex for NEH Region, Barapani.	Noney (Tamenglong) District, Charoi-Chagotlong, Tupul, Manipur - 795159	8415832455	Dr. Pankaj Kr. Saraswat
	Thoubal	Director (Agril.),Dept. of Agriculture, Govt. of Manipur, Imphal	KrishiVigyan Kendra, Rice Khangabok, Thoubal-795138	8415902143	Dr.S.Zeshmarani
	Ukhrul	Director, ICAR Research Complex for NEH Region, Barapani.	KrishiVigyan Kendra Ukhrul, Hundung , Ukhrul-795142 Manipur	9436158901, 8974919867	Dr. Y. Ramakrishna
Meghalaya	East Khasi Hills	Director (Agril.), Dept. Of Agriculture, Govt. of Meghalaya, Shillong	KVK, East Khasi Hills, Upper Shillong, Meghalaya-793009	0364-2560132	Smt. Badahunlang Wahlang
	Jaintia Hills	Director (Agril.), Dept. Of Agriculture, Govt. of Meghalaya, Shillong	KrishiVigyan Kendra, Jaintia Hills Government of Meghalaya,Directorate of Agriculture, P.O. Rymphum, Jowai, District-JaintiaHillsMeghalaya- 793150	0365-222-3343	Shri Dodo Pasweth
	Ri-Bhoi	Director, ICAR Research Complex for NEH Region, Barapani.	KrishiVigyan Kendra, Ri-Bhoi, CAR Research Complex for NEH Region, District - Ri-Bhoi, Umroi Road, Umiam-793103 Meghalaya	9089611347	Dr. Md. Mokidul Islam
	West Khasi Hills	Director (Agril.), Dept. Of Agriculture, Govt. of Meghalaya, Shillong	KVK, West Khasi Hills, Nongshillong P.O Nongstoin, District- West Khasi Hills, Meghalaya, Pin-793119	7005212734	Shri. P. N Wahlang
	West Garo Hills	Director, ICAR Research Complex for NEH Region, Barapani.	Krishivigyankendra, icar research complex for neh region, sangsanggiri, p.o: dobasipara, tura west garo hills district, meghalaya-794005	3651222535	Dr. Joyoshree Mahanta

	East Garo Hills	Vice Chancellor, CAU, Imphal, Manipur.	KVK-East Garo Hills, Megagre Meghalaya-794111	6351938828	Dr. Brijendra Singh Rajawat
	South Garo Hills	Vice Chancellor, CAU, Imphal, Manipur.	KrishiVigyan Kendra, Chokpot, Meghalaya PIN-794005	9774912620/96150530 42	Dr. Athokpam Haribhushan
Mizoram	Aizawl	Vice Chancellor, CAU, Imphal, Manipur.	KVK Aizawl, CVSc, CAU, Selesih, Mizoram. 796014	3892345636	Dr. K.P. Chaudhary
	Champhai	Director of Agriculture Research & Education, Dept. Of Agriculture, Govt. of Mizoram, Aizawl	KrishiVigyan Kendra (KVK), Khawzawl,PO-Khawzawl, Dist.-Champhai (MIZORAM)-796310	03831-261484, 261486	Dr. Henry Saplalrinliana
	Kolasib	Director of Agriculture Research & Education, Dept. Of Agriculture, Govt. of Mizoram, Aizawl	Kolasibp.o.kolasib – 796081, Mizoram	03837-220360	Dr. Michelle C. Lallawmkimi
	Lawngtlai	Director of Agriculture Research & Education, Dept. Of Agriculture, Govt. of Mizoram, Aizawl	KVK Lawngtlai District Lawngtlai, Mizoram, PIN – 796891	8399069138	Dr. C. Lalfakawma
	Lunglei	Director of Agriculture Research & Education, Dept. Of Agriculture, Govt. of Mizoram, Aizawl	kvklunglei district, hnahthialmizoram – 796 571	0372 – 2332637	Dr. Lalmuanzovi
	Mamit	Director of Agriculture Research & Education, Dept. Of Agriculture, Govt. of Mizoram, Aizawl	KVK, Mamit District, Lengpui-796421, Mizoram	0389-2573352	Dr. Vanlalhruaia Hnamte
	Saiha	Director of Agriculture Research & Education, Dept. Of Agriculture, Govt. of Mizoram, Aizawl	KVK Siaha, Siahatla-III,Siaha District, Siaha, Mizoram	9436152189	Dr.H.Vanlalhmuliana
	Serchhip	Director of Agriculture Research & Education, Dept. Of Agriculture,	Kvk, n.vanlaiphai Serchhip district	03838224340	Dr.T.Vanlalngurzauva

		Govt. of Mizoram, Aizawl			
Nagaland	Dimapur	Director, ICAR Research Complex for NEH Region, Barapani.	KrishiVigyan Kendra Dimapur		vacant
	Kiphire	Director, ICAR Research Complex for NEH Region, Barapani.	KVK, Kiphire ICAR for NEH Region Nagaland Centre	708577 7870	Dr. N .Khumdemo Ezung
	Kohima	Director (Agril.), Dept. Of Agriculture, Directorate of Agriculture, Govt. of Nagaland, Kohima	Kohima-Mokokchung Rd, Nagaland 797109	943607 3135	Dr. Akashe Zhimomi
	Longleng	Director, ICAR Research Complex for NEH Region, Barapani.	KVK, Longleng (Post Box no: 10), Below DC Office, PukyongPhom Residence, Longleng-798625, Nagaland	369223 6386	Dr.K.L. Meena
	Mokokchung	Director (Agril.), Dept. Of Agriculture, Directorate of Agriculture, Govt. of Nagaland, Kohima	KVK Yisemyong Post Box No-23 Mokokchung Nagaland-798601	940234 3069	Dr.PijushKanti Biswas
	Mon	Director (Agril.), Dept. Of Agriculture, Directorate of Agriculture, Govt. of Nagaland, Kohima	Ngangching Road, Aboi – 798 603, Mon	943601 1240	Dr. RuokuovilieMezhatsu
	Phek	Director, NRC on Mithun, Jharnapani, Nagaland	KVK Phek, ICAR-NRCM, Porba, PO-Pfutsero-797107, Phek District, Nagaland	943601 6471	Dr.T.Esther Longkumer
	Peren	Director, ICAR Research Complex for NEH Region, Barapani.	KrishiVigyan Kendra Peren, Village Jalukie Town, PerenDistt. of Nagaland	961290 2239	Z. James Kikon

	Tuensang	Director (Agril.), Dept. Of Agriculture, Directorate of Agriculture, Govt. of Nagaland, Kohima	KrishiVigyan Kendra, Kuthur Seed Farm, Post Box-179, Tuensang. Nagaland798612.	7085879890	Dr. Keviletsü Khate
	Wokha	Director, ICAR Research Complex for NEH Region, Barapani.	Krishi Vigyan Kendra, Wokha Longsachung village near Satusphen, P.O. Wokha, Post box: 137, Nagaland-797111	9436108526	Dr. Santosh Kumar Baishya
	Zunheboto	Vice Chancellor, Nagal and University, Kohima.	KVK, Nagaland University, Lumami, P.O. Lumami PIN-798627	(0369)2268256	Dr. Rakesh Kumar Chaurasia
Tripura	Dhalai	Director, State Dept. of Agri., Govt. of Tripura, Agartala-799001	Sr. Scuentist & Head, KrishiVigyan Kendra, Dhalai, Salema, 799278	38262263273	Pradip Kumar Das
	Gomati	Director, State Dept. of Agri., Govt. of Tripura, Agartala-799001	Rangkang Farm, Amarpur,Gomati Distt. of Tripura	9436123647	Farukul Islam
	Khowai	Sri Ramakrishna Seva Kendra, 81, Bondel Road, Kolkata	KVK, Khowai, P.O. Chebri, Dist: Khowai, Tripura- 799207	8974879511	Dr. Dipankar Dey
	North Tripura	Director, State Dept. of Agri., Govt. of Tripura, Agartala-799001	Office of The Senior Scientist & Head KrishiVigyan Kendra North Tripura P.O and P.S. - Panisagar 799260 Panisagar North Tripura	03822-261043	Abhijit Debanth
	South Tripura	Director, ICAR Research Complex for NEH Region, Barapani.	Kristi Vigyan Kendra, South Tripura (ICAR for NEH Region) Birchandra Manu, P.O.: Manpathar South Tripura, PIN: 799144	03823-252523/7085589817	Mr. Diganta Sharmah
	West Tripura new	Director, ICAR Research Complex for NEH Region, Barapani.	KVK, West Tripura, Jirania, P.O. Belbari 799045	9436168343	Dr. Mandira Chakraborti

	Unakoti	Director, State Dept. of Agri., Govt. of Tripura, Agartala-799001	Krishi Vigyan Kendra, Chantail Orchard, Kailasahar., Unakoti Distt. of Tripura	943632 9294	Dr. Aniruddha Bhattacharjee
	Sepahijala	CAU, Imphal, Manipur	KVK Sepahijala Latiacherra, Tripura	908947 1596	Dr. Shatabhisa Sarkar

Annexure 2

Members of QRT (ATARI Umiam and Guwahati)

(2011-12 to 2018-19)

Sr. No.	Name & Designation	Chair/ Member	Mobile number	Email address
1.	Dr. K. D. Kokate, Former DDG (AE), ICAR New Delhi	Chairman	9420616721	kdkokate@gmail.com
2.	Dr. B. S. Hansara, Former ADG (AE), ICAR New Delhi	Chairman	9971254407	hansrabaljit@gmail.com
3.	Dr. S. V. Ngachan, Former Director ICAR-RC for NEH region, Umiam	Member	9436349035	svngachan@rediffmail.com
4.	Dr. H. C. Bhattacharya, Former DEE, AAU, Jorhat	Member	9957230094	hemenbhatta@gmail.com
5.	Dr. A. K. Vashisht, Former ADG, PIM, ICAR New Delhi	Member	9582898982	amitvasisht@rediffmail.com
6.	Dr. A. K. Singha, Principal Scientist, ICAR-ATARI, Umiam	Member Secretary	9101701355	aksingha0101@gmail.com

भाकृअनुप
ICAR

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भारतीय कृषि अनुसंधान परिषद

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