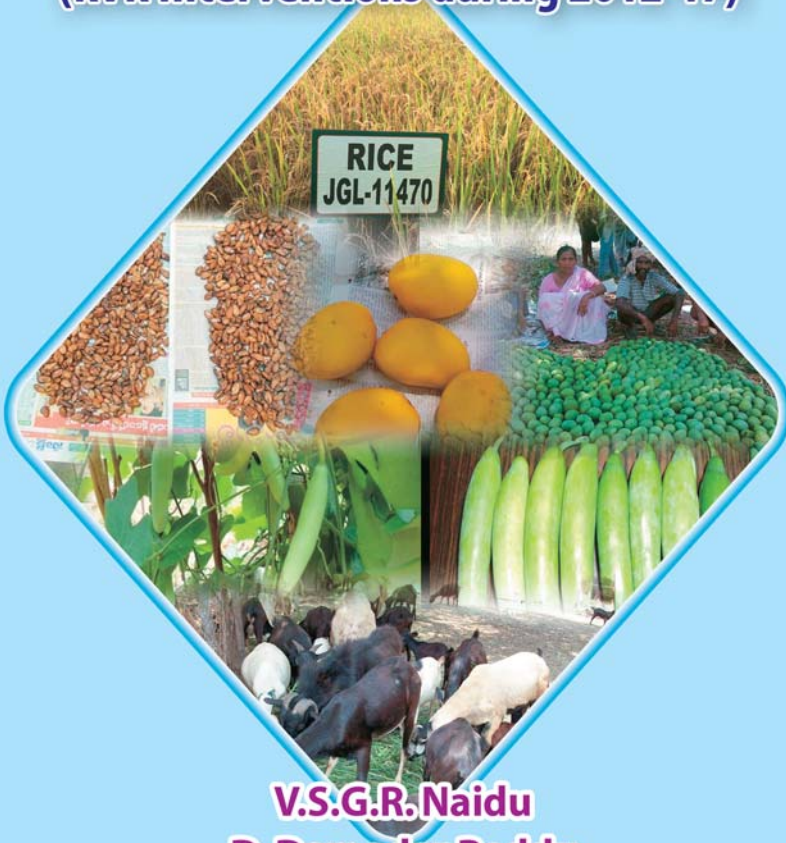


TECHNOLOGY ASSESSMENT AND REFINEMENT (KVK Interventions during 2012-17)



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East Godavari District, Andhra Pradesh
March, 2017



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FOREWORD

Technology involves application of science and knowledge to practical use. Technology can be most broadly defined as the entities, both material and immaterial, created by the application of mental and physical effort in order to achieve some value. The agricultural technology is a complex blend of materials, processes and knowledge. In Indian agriculture, research system comprises of ICAR Institutes, SAUs, Departments like DBT, DST, other Science and Technology Institutions and Commodity Boards. NGOs, Corporate and farmer innovators also contribute to technology generation. Testing, adaptation and integration processes constitute technology assessment and refinement which KVK system executes through On Farm Trials (OFTs). The present publication describes different technologies in agriculture, horticulture and animal science that were assessed and refined through OFTs during the period 2012-17. The results obtained through OFTs are documented in this bulletin for different end users. I hope this bulletin would serve as a good source of information for researchers, extension functionaries, students and farmers.



(D. DAMODAR REDDY)

Director

25 March, 2017
Rajahmundry

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High yielding rice varieties JGL-11470 and Mugad SIRI-1253 for upland areas of East Godavari district

Nature of Problem

In East Godavari district, BPT-5204 (Samba Masuri) rice variety is widely cultivated during kharif season in upland areas, but yields are low due to incidence of pests and diseases and also due to crop lodging.

Intervention

Fine grained, medium duration and high yielding varieties JGL-11470 (Jagtial Masuri) and Mugad SIRI-1253 were tested in farmers' fields.

JGL 11470 (Jagtial Masuri)

Source: Regional Agricultural Research Station, Jagtial (TS).

Year of release: 2010

Super fine grain variety, resistant to gall midge and tolerant to blast. This variety matures in 135 to 140 days with an average yield of 62 q/ha.

Mugad SIRI-1253

Source: University of Agricultural Sciences, Dharwad. Year of release: 2010

This is a fine grained rice variety with cooking quality comparable with BPT- 5204 and has average yield of 48 to 55 q/ ha. This variety found to be moderately resistant to blast disease and comes to harvest one week early compared to other rice varieties. This variety matures in 135 to 140 days.

BPT-5204 (Samba Masuri)

Source: Agricultural Research Station (ANGRAU), Bapatla:

Year of release: 1986

A fine variety of 150 days duration with an average yield of 60 q/ ha (irrigated condition). It is susceptible to BPH, gallmidge, sheath blight, BLB, blast and stem borer.

Treatment	Details	Yield q/ha	% increase in yield	BCR
T-1	JGL-11470	67.5	20	2.34
T-2	Mugad SIRI-1253	71.62	27	2.48
T-3 (FP)	BPT-5204	56.25	-	2.0



Impact/Farmers' feedback

- Both the tested varieties were good with respect to their yield, grain quality and early maturity.
- Despite low yields, BPT-5204 was preferred for its cooking quality and market demand.

Bacterial Leaf Blight (BLB) tolerant rice varieties RP Bio-226 (Improved Samba) and MTU-1112 for yield improvement

Nature of Problem

BPT-5204 (Samba Masuri) rice variety is predominant and widely cultivated during kharif season in upland areas. This area is endemic to Bacterial Leaf Blight (BLB) disease, which is causing significant reduction in the yield of Samba Masuri.

Intervention

BLB tolerant rice varieties RP Bio-226 and MTU-1112 with yield and grain qualities comparable to BPT-5204 were tested.

RP Bio-226 (Improved Samba Masuri)

Source: Indian Institute of Rice Research, Hyderabad. Year of release: 2007

It is an improved, bacterial blight resistant, high yielding, fine grain variety possessing premium grain and cooking quality. Crop duration is 135-140 days. Under conditions of bacterial blight infestation, Improved Samba Masuri reportedly gives 15-30% more yield than any other bacterial blight susceptible variety.

MTU-1112

Source: A. P. Rice Research Institute (ANGRAU), Maruteru.

Year of release: 2012

High yielding, non-lodging, medium slender grain type, low shattering, good cooking quality, 3 weeks seed dormancy, tolerant to BPH and BLB.

BPT-5204(Samba Masuri)

Source: Agricultural Research Station (ANGRAU), Bapatla.

Year of release: 1986

A fine variety of 150 days duration with an average yield of 60q/ha (irrigated condition). It is susceptible to lodging, pests and diseases like BPH, gall midge, stem borer, sheath blight, BLB and blast.

Treatment	Details	Yield q/ha	% increase in yield	BCR
T-1	RP Bio-226	60	33	2.20
T-2	MTU-1112	52	15	1.94
T-3 (FP)	BPT-5204	45	—	1.67



Impact/Farmers' feedback

- MTU-1112 showed good performance with higher yield, resistance to BLB and non-lodging. But, the market price is Rs. 900-1000 per bag (75kg). Average yields were 25-30 bags/ac.
- RP Bio-226 has good market price of Rs. 1200 per bag (75kg). Average yields were 30-35 bags/ac.
- The RP Bio-226 has replaced the BPT-5204 in about 75% of the area under BPT-5204 in the district.

Drum seeder with 5 drums facilitates formation of alleys in rice

Nature of Problem:

Farmers have adopted 4-drum rice seeder which was introduced earlier. The width of present drum seeder with four drums is 1.6 m., which is not suitable for making alleys at 2 m. interval as recommended.

Intervention:

In order to make alleys at a regular interval of 2m the present drum seeder was refined as per the farmers' feedback by adding one more drum to the existing 4 drums and assessed against the 4- drum seeder.

Treatment	Area covered (in 6 hours)	Yield q/ha	% increase in yield	BCR
Sowing with 5 drum seeder	5 acres	52.7	8.2	1.74
Sowing with 4 drum seeder	3 acres	52.5	7.8	1.67
Transplanting (Manual)	1 acre	48.7	-	1.15





Impact/Farmers' feedback:

- Area covered with five drum seeder was 40% more than that of four drum seeder in a unit time and also reduced the labour cost (Rs 1500/ha) towards preparation of alleys.
- 5- drum seeder facilitated the formation of alleys at 2m interval which helped in better aeration and sunlight penetration.
- There was weight increase of 600g in 5 drum seeder over 4 drum seeder.
- The ease of operation was better in 4-drum seeder when compared to 5-drum seeder.

Bud seedlings as planting material in sugarcane for reducing cost of cultivation and yield improvement

Nature of Problem:

Sugarcane is normally propagated by stalk cuttings consisting of 2 to 3 budded setts. In case of conventional system of sugarcane cultivation, about 6 – 8 tonnes seed cane/ha is used as planting material, which comprises of about 32,000 stalk pieces having 2-3 buds. This large mass of planting material poses a great problem in transport, handling and storage of seed cane and undergoes rapid deterioration thus reducing the viability of buds and subsequently their sprouting.

Intervention:

One alternative to reduce the mass and improve the quality of seed cane would be to plant excised axillary buds of cane stalk, popularly known as bud chips. These bud chips are less bulky, easily transportable and more economical seed material. The leftover cane can be well utilized for preparing juice or sugar or jaggery. Establishing the sugarcane crop using bud chips in place of setts could save about 80% by weight of the stalk material and reduce the cost of sugarcane production. Seed requirement is reduced to less than 1t/ha.

Source/supplier : Mr. Rosanlal Vishwakarma
of bud chipper Village Mekh, Block Gotegaon, District
Narsinghpur, Madhya Pradesh
Mobile: 09300724167

Treatment	Details	Yield q/ha	% increase in yield	BCR
T-1	Bud chip seedlings	100	29	1.59
T-2	Sett planting	77	-	1.15

Refinement: Single budded nodes as seed material.

Bud chip seed material contains relatively low food reserves (1.2-1.8 g sugars /bud) compared to conventional 3 budded setts (6.0-8.0 g sugars/ bud). The food reserves and moisture in the bud chips depletes at a faster rate which is reflected in their poor sprouting and early growth without treatment. Instead of scooping the bud chip, whole node (single budded node) was used as seed material as it contains higher food reserves to support sprouting and the early growth. The motorized node cutter was used for cutting the nodes.

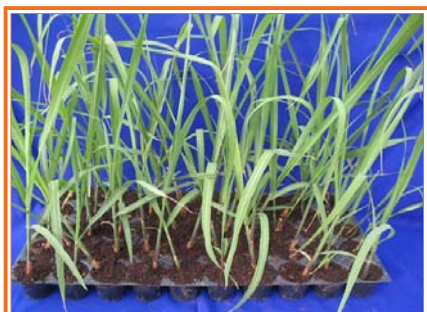
Source/supplier of : Mr. Gurram Pattabhi Rama Prasad,
Node Cutter Guntur, A.P (supplier)
e-mail: gpramprasad@gmail.com

Comparison between sett planting and bud seedling planting

Particulars	Sett Planting	Bud seedlings
Uniformity among plant population	Not uniform	Uniform as the seedling grading is done before planting
Mortality rate	High	Low
No. of tillers per plant	6-8	15-20
Planting material cost	Sets @ Rs. 2500/t: Rs. 25, 000 (10t/ha)	Nodes @ Rs. 2500/t: Rs. 5000 (2t/ha)
Labour charges	Rs. 20, 000/ha	Rs. 10, 000/ha
Yield	85 t/ha	100 t/ha
BCR	2.3	3.33
1. Reduction in cost of cultivation by Rs. 30, 000/- per hectare (Rs. 20, 000/- seed material and Rs. 10, 000/- labour charges).		
2. Yield increase by about 15%.		

Impact/Farmers' feedback:

- It is well adopted by the farmers and about 1000 ha of the sugarcane growing area (12000 ha.) in the district is under bud seedling crop.
- The sugar factory (Nava Bharat Ventures Ltd.) at Samalkot is promoting bud seedling crop by supplying bud seedlings to the contact farmers.



Yellow Mosaic Virus (YMV) tolerant Black gram variety PU-31 for higher yields

Nature of Problem

Black gram is mainly cultivated during rabi in rice fallows in delta and upland areas in the district. YMV, transmitted through white fly, is a serious production constraint in black gram cultivation in the district. Yellow mosaic incidence is severe and local as well as most of the improved varieties are highly susceptible resulting into low yields. The yield loss due to this disease is 5-100% depending upon disease severity, susceptibility of cultivars and population of white fly.

Intervention

High yielding black gram variety PU-31 which is tolerant to YMV was tested against the cultivated varieties.

Source: G.B. Panth University of Agriculture and Technology, Panthnagar, Uttarakhand.

Year of release: 2005

Treatment	Details	Yield q/ha	% increase in yield	BCR
T-1	PU-31	6.25	71	2.86
T-2	LBG-752	4.60	26	2.3
T-3(FP)	T-9	3.65	—	1.8



Impact/Farmers' feedback

Despite fetching lower price than other varieties due to its dull colored and smaller grain PU-31 was well adopted because of its tolerance to YMV and higher yields.

Low cost and safe methods for ripening the mangoes

Nature of Problem

Mango fruits ripen unevenly on the tree and the natural ripening process after harvest is also very slow and unpredictable. It takes about 5 to 6 days for mature mangoes to ripen naturally. To fetch higher price for the mangoes, the traders/farmers catch the markets early in the season by artificially ripening immature fruits in closed rooms by using harmful Calcium Carbide. Acetylene is generated from Calcium Carbide by the addition of water or by contact with moisture in air and acts on fruits causing them to ripen in a similar manner to ethylene. One of the main reasons to practice this process is to cut short the time taken by fruits to ripen naturally. Calcium Carbide (CaC_2) reportedly contains arsenic and phosphorus, both of which can prove fatal for human beings. CaC_2 is a known carcinogen - an agent having the ability to alter human cells into cancerous cells.

Intervention

To overcome such problem, fruits can be ripened by exposing them to Ethrel, which initiates the early and uniform ripening process in mature fruits. 'Ethrel' is a plant hormone, and its use for ripening process is accepted as organic practice. It releases ethylene gas on atmospheric exposure thereby hastening the ripening process of any fruits located in its vicinity. For ripening a small quantity of mangoes i.e. 1 or 2 baskets for household purpose, the fruits can be dipped in Ethrel solution.

Treatment	Observations
1. Dipping unripe mature fruits in 0.1 per cent Ethrel solution (1 ml of Ethrel in 1 litre of water) and wipe it dry. The fruits are then spread apart over a paper or cloth and a thin cotton cloth is covered over this.	Improved peel color and accelerated ripening. The fruits ripened in two days. The ripe fruit texture (firmness) is better.
2. Ripening mangoes with Calcium Carbide in closed rooms	Very poor taste compared to Ethrel treated fruits

For large quantity of fruits: 10 ml of 'ETHREL' (Ethephon 39%) and 2g of Sodium Hydroxide (NaOH) pellets are mixed in five litres of water in a wide mouthed vessel. This vessel is placed inside the closed chamber near the fruits and the room is sealed air tight. About a third of the room is filled with fruits leaving the remaining area for air circulation. Ripening of fruits was observed in about 12 to 24 hours.

"In order to reduce the cost of chemical, some ethylene releasing fruits such as papaya and banana can also be kept in the same room. Since Ethrel is a plant hormone and hastens the ripening process by the release of ethylene in the atmosphere this practice may be the safest method"



Impact/Farmers' feedback:

- Some of the farmers have started using the ripening chambers set up by Dept. of Horticulture, Govt. of A.P.
- Special sale counters were opened in market yards for selling mangoes ripened in the ripening chambers.

Drying Cocoa beans during unfavourable (cloudy and rainy) conditions

Quality of cocoa is determined by a combination of factors that determine the acceptability of the cocoa to a buyer. These factors include proper fermentation, dried to the proper moisture level, free from abnormal odours and free from mould contamination. Drying is an important step in cocoa processing as some of the reactions which produce good flavoured cacao are still proceeding during the drying process. Cocoa beans are dried after fermentation in order to reduce the moisture content from about 60% to about 7.5%. The drying process is also a continuation of the oxidative stage of fermentation of the beans, thus, further reducing the constringency and bitterness of the product. Properly dried beans, usually at about 6-8% moisture content (wet basis) have reduced acidity and are characterized by the familiar 'chocolate' brown colour. Drying must be carried out carefully to ensure that off-flavours are not developed. Drying should take place slowly. Ideally beans should be dried over a five to seven day period. This allows acids in the beans to evaporate and produce a low acid, high cocoa flavoured product. If the beans are dried too quickly, some of the chemical reactions started in the fermentation process are not allowed to complete their work and the beans are acidic with a bitter flavour. Methods of drying the beans are usually by sundrying and artificial or forced air drying depending on some socio-economic considerations and prevailing climatic conditions.

Nature of Problem

Cocoa beans are usually dried by sundrying in this district. It is simple and cheap but it is labour intensive and there is much concern for a stable weather condition. For sun drying, the beans are spread out on mats or trays or on concrete floors in the sun. The beans are normally turned or raked to ensure uniformity of drying and the beans need to be covered when it rains. With adequate sunshine and little rainfall, sun drying may take about one week, but if the weather is dull or rainy it will take longer. During periods of heavy rain, the cocoa may not be able to be sun dried sufficiently and mould contamination will occur.

Intervention

A solar dryer was tested for drying beans and compared against drying in poly chamber and sun drying. Cocoa pods were collected from farmers' fields and fermented the beans for 5 days. Beans were dried separately in Solar Dryer, Poly-chamber and Sun-dried (Open conditions) for 40 hours.

Parameters in drying cocoa beans are mentioned in the table.

Treatment	Weight of cocoa beans before drying	Time taken for drying cocoa beans	Weight of cocoa beans after drying	Average rainfall during the period of experiment	Temperature recorded during the period of experiment (Average)
T-1: Solar Dryer	10 kg	22 hours	1200 gm	17 mm	36.5°C
T-2: Poly-Chamber (Naturally ventilated)	10 kg	36 hours	1350 gm	17 mm	33.0°C
T-3: Sun drying (Farmers' Practice)	10 kg	40 hours	1580 gm	17 mm	30.5°C

Dried beans were assessed for quality parameters at **M/s. Cadbury India Limited, Eluru.**

Quality Parameters	Open Drying of Beans	Beans dried in Solar Dryer
Moisture	6.16	6.63
Bean count	106	104
Cut test : Fully brown	82	85
Partly Brown	18	15



Impact/Farmers' feedback

- Solar dryers and poly chambers served the purpose of drying cocoa bean during rainy season.
- Poly chambers are preferred as they are less expensive and can be fabricated with the locally available material.

Integrated management of snails in horticultural crops

Nature of Problem

Farmers in Alamuru, Kadiam Mandals of the East Godavari district experienced heavy losses due to snail infestation in important horticultural crops. The snails eat away leaves, stems, fruits and flowers of host plants causing severe damage to young saplings especially in nurseries. It frequently climbs on cucurbit pandals, papaya and banana plants and clings on leaf surface thus interfering with cultural operations.

It is reportedly an exotic pest 'Giant African Snail' (*Achatina fulica*). It is very active during rainy seasons, nocturnal in nature and damages crops like papaya, guava, brinjal, okra, chillies, chrysanthemum, tuberose etc.

Farmers informed that, the snail population spread from field to field in the area ever since it was found during the year 2011-12. At the initial stage the farmers have not taken any control measures as they have never perceived it as a harmful pest and that has led to increased infestation and severe loss to different horticultural crops.

Intervention

Integrated management involving manual, chemical and biological methods.

Treatment	Observation
T-1: Bait A. Jaggery slurry (Jaggery 200 gm. in required water) + 250 ml. Dichlorovas + 1 kg. Wheat flour or Rice flour. B. Jaggery slurry (Jaggery 6 kg in 12 litres of water) + 100 gm. Methomyl + 25 kg rice bran / wheat flour.	Observed 23-28% mortality and also no egg masses in bait spread area. Higher Mortality was observed in wheat flour based bait compared to rice flour bait.
T-2 : Spraying: • Azadirachtin (1500 ppm) @ 5ml. per litre.	Due to repellent mode of action, no snail population was

<ul style="list-style-type: none"> • Blitox 3 g per litre. • Dipping gunny bag cloth in 15% Salt solution and spreading it in intense infestation areas. 	<p>observed in neem oil treated fields. Snails gathered in groups on gunny bags.</p>
<p>T-3: Farmer's Practice Salt application (Spreading salt in crop borders)</p>	<p>Mortality (6%) observed after 72 hours.</p>

- Slow feeding on bait.
- 23-28% mortality observed in A&B.
- Mortality of snails was higher with the wheat flour based bait compared to rice flour bait.
- No mortality in neem oil treated fields but, repellent mode of action was noticed.
- No mortality on salt laden gunny bags but, snails grouped on gunny bags and farmers were able to collect and destroy them.



Impact/Farmers' feedback

- Bait formulation with wheat flour was effective.
- Some of the farmers are using salt laden gunny bags for collecting and destroying the snails.

Skirting Banana bunches for improvement of fruit quality

Nature of Problem

Banana is one of the major fruit crops in East Godavari District. Bunches are generally exposed to biotic and abiotic stresses resulting in poor quality of bunches and less weight. Inconsistent size and presence of black spots on the fruit skin are very common and that fetches lower price. Farmers used to cover the bunch with dried banana leaves that requires skilled labour and involves drudgery.

What is required is a cover or a bag which protects the fruit from insect attacks, and at the same time allows water, air to pass through, all at an affordable cost.

Intervention

Poly Propylene Non-woven Skirting Bag, an innovative technical textile product, comes in handy in addressing all the needs. 17 GSM fabric in white color, stabilized with UV has been found suitable for this application. These bags are fabricated to the size of 0.8m X 1.2m. It is also available as a tube in roll form.

- Skirting was tested in the fields of four progressive farmers and 1000 banana bunches were covered.
- Skirting was done three months before the harvest.
- Both the ends were tied with a country twine.
- If handled carefully, bags can be used for 2-3 harvests.

Results

No skirting (Farmer's practice)	Skirting of bunches
<ul style="list-style-type: none">• Noticed black spots on fruit skin in most of the bunches.• Average weight of each bunch is 12-13 kg.	<ul style="list-style-type: none">• The bunch is free from insect bites, fungi, bacteria attacks and physical injuries.• Improved bunch appeal

- Average weight of each bunch was 13.5 to 14 kg.
- Yield was improved by 2 to 2.5 kg more per bunch.
- Early to harvest by an average of 10 days.
- Protection of bunches from monkey menace also.



Impact/Farmers' feedback

- Early harvest by 10-12 days
- Free from black spots
- Uniform size of fruits
- Higher yield

Virus tolerant planting material in *Coccinia* (Little gourd)

Nature of Problem

Little gourd (*Coccinia indica*) grown in Alamuru, Athreyapuram, Kadium and Rajanagaram mandals was severely infested with virus which caused heavy crop losses. Earlier, virus free planting material selected from farmers' fields was tested. Though, it was virus free, yields were not much improved.

Intervention

Tissue cultured planting material was tested in the virus prone areas in these mandals. Initially the saplings were raised in poly bags for their acclimatization and then supplied to the farmers for planting in the field.

Source of planting material: Sun Agrigenetics Pvt. Ltd, 2nd Floor, Reign Plaza, Gorti Road, Vadodara - 390 021, Gujarat, India, Telephone: +91 265 232 2138, E-mail: info@sunagri.in

Observation

- Tissue cultured plants were well established to this agro-climatic situation.
- No virus symptoms were observed in farmers' fields and also in KVK demonstration block.
- Initial growth was vigorous with strong twining and early bearing was observed as the stumps started bearing within 45 days.
- Fruits measuring 8.0 to 9.5 cm long with smooth skin and mild stripes.
- Inter-nodal length is short compared to local variety.
- Shelf life of the fruits from tissue cultured plants is 5 to 6 days more compared to that of local variety.

Treatments	Yield (t/ha)	Gross Income (in Rs.)	Net Income (in Rs.)	BCR
T-1: Tissue Cultured planting material.	14	1,40,000	68,000	1.9

T-2: Selection from farmers' field	6.5	65,000	27,000	1.7
T-3: Local Variety	4.5	45,000	13,000	1.4



Impact/Farmers' feedback

- Tissue cultured plants established easily with early bearing.
- No virus incidence was observed.
- Realized higher yields.

Azolla as poultry feed supplement

Nature of Problem

Feed is the most expensive of all inputs in the poultry production. Escalating cost and unavailability of the feed ingredients are the major deterrent for target production.

Intervention

As feed related improvement has a profound effect on the performance and profitability of poultry, *Azolla* was tested as alternative feed ingredient as it was proven cost effective.

Azolla is one of the plant resources with high biomass and protein production. It is most promising from the point of view of ease of cultivation, productivity and nutritive value. It is widely distributed and is found in ponds, ditches and channels containing stagnant water with a temperature range of 15- 35^o C. It grows in aquatic habitats and absorbs nutrients mainly from water. In shallow water the plant roots attach to

the soil and absorb nutrients from the soil. Poultry, particularly ducks and chickens, can be raised on a diet including fresh *Azolla*. Fresh *Azolla* could replace about 20% of commercial feed in the diet of young chickens.

Azolla was harvested every day and was put into a bamboo basket for one hour before feeding in order to drain the excess water from the plant. The fresh *Azolla* amounting to 10% of the regular feed was offered four or five times per day. The times increased with the age of the birds to minimize losses. A supplementary source of vitamins and minerals was not included in the diets of the groups that received *Azolla* and yet there were no obvious health problems or deficiency symptoms indicating that the *Azolla* was supplying these essential nutrients. This apparent capacity of *Azolla* to supply vitamins and minerals is an important advantage in rural areas where premixes may not be available or are expensive. However, the chicken were given starter diets, which contained vitamins and minerals, up to one month of age, and some of these would have been stored in the body.

Results

- *Azolla* production: 200g/day from 1m² shallow ditch (10 cm depth).
- Normal feed requirement: 50g per bird per day. (1 kg of feed can be fed for 20 days).
- Cost of 1 kg feed: Rs. 20/-
- Feed requirement if 10% feed is supplemented with *Azolla*: 45 g per bird per day. (1 kg of feed can be fed for 22 days).
- Cost of 1 kg feed: Rs. 18/-
- Saving Rs. 2 per kg of feed.
- No bird died during the testing period, indicating that supplementing the regular feed with *Azolla* had no deleterious effect.
- The final body weights were improved by about 15%.
- No reduction in egg production was observed at 10% replacement of *Azolla* along with regular feed.



Impact/Farmers' feedback

- Demonstration units were established in association with ATMA and Kamadhenu Foundation (NGO).
- Widely adopted in the district especially for backyard poultry.

Introduction of Jodipi rams in local flocks to reduce inbreeding depression

Nature of Problem

Inbreeding depression is common in local flocks due to continuous use of same ram or its progeny for crossing for generations.

Intervention

Jodipi rams were introduced in local flocks for crossing with local ewes to avoid inbreeding (breeding with a ewe of the same place) and promote healthy sheep rearing.

Jodipi is a Nellore sheep breed and it is one of the three distinct colors of the breed. The white one is Palla, the white with black spots is Jodipi and the red-brown is Dora. The Jodipi rams have high resistance to diseases and are meatier than ordinary sheep. Jodipi breed weighs 50 to 60 kg while the local sheep weighs 30 to 35 kg.

Results

- Successfully introduced rams of Jodipi breed in local flocks. 10 Rams were supplied to the farmers having herd of local breeds.
- In the third generation the progeny was completely resembled the Jodipi.
- It has adopted and thriving like local breed.
- The body weight was 8-10 kg more than the local rams.



Impact/Farmers' feedback

- Sheep in the heard were healthier than earlier

Black Bengal goats for backyard goat rearing

Nature of Problem

Prolific goat breed is the need of the hour to meet the demand of meat market as the local goats have low population build up.

Intervention

Introduced Black Bengal breed of goat which are prolific i.e., quick population build up, high disease tolerance ability and can adapt to local environment.

Black Bengal breed of goat is found in West Bengal, Bihar, Odisha and Bangladesh. It is small in size with tight body structure, small horn and

short legs. Goats are usually black in colour, but also found in brown or white or grey colour. It is very suitable for meat, milk and skin production. The milk and meat of this goat is very tasty and nutritious than any other goat breed.

Observations

- Age at maturity is 3-4 months.
- Birth to first kidding is 8 months (3+5 months gestation)
- Average weight gain is 3kg /month till the kids attain 20 kg weight
- Whereas, adults gain only 1.5 kg per month
- Within 6 months they attain 18-20 kg. (3 kg X 6 months)
- Average kidding is 1.5 for 1st kidding
- Average kidding is 2 from 2nd kidding onwards
- Sometimes 3 or 4 or even up to six kids are possible.
- We can expect one kidding for every six months
- Next heat is observed within 10 days after kidding
- The weight of male is 27 to 29 kg.
- The weight of female is 20 to 21 kg.

Result

Particulars	Black Bengal goat	Local goat
Kidding	Kidding twice in a year. Two kids (avg.) per kidding	One kidding in a year. One kid per kidding.
Population build up	8 number (average) (Avg. body weight 18 kg)	4 number (average) (Avg. body weight 20 kg)
Cost of pair of kids (approx. 10 kg body weight each)	Rs. 5, 000/-	Rs. 5, 000/-
Cost of rearing (@ Rs. 125 per goat per month)	Rs. 7, 500/-	Rs. 4,500/-

Gross income (approx) Based on the Price @ Rs. 250/- per kg live body weight	Rs. 36, 000/-	Rs. 20, 000/-
Net income	Rs. 23, 500/-	Rs. 10, 500/-
BCR	2.88	2.1



Impact/Farmers' feedback

- High net returns due to kidding at least twice in a year and low mortality.
- Ease of rearing as this breed doesn't have feed preference.
- Mixing well with other breeds and even with sheep.

Oestrous synchronization for timed Artificial Insemination (A.I) in buffaloes

Nature of Problem

Buffalo is the principal milk-producing animal contributing more than 80% of total milk production in the district. It is a better dairy animal in comparison to cattle in terms of better feed (roughage) conversion efficiency, greater resistance to diseases, and higher milk fat percentage. However, it has poor reproductive efficiency due to its late maturity, long post-partum period to cyclicity and poor oestrus expressivity. Anoestrus is one of the most serious reproductive problems affecting 30-40% of the total buffalo population.

Intervention

In order to overcome the anoestrus condition, animals are to be induced into heat and are artificially inseminated to achieve maximum improvement in reproductive efficiency. To increase reproductive efficiency through induction of heat in buffaloes Ovsynch protocols were designed.

The OvSynch protocol consists of an injection of GnRH followed by PGF 7 days later, a second injection of GnRH is given 48 to 56 h after PGF treatment with fixed-time A1 (Artificial Insemination) 16 hours later. The rationale for this protocol is that the first Gonadotropin Releasing Hormone (GnRH) will induce LH release and ovulation of a dominant follicle and emergence of a new follicular wave within 2 days. The administration of PGF 7 days later will induce luteolysis and the second GnRH will induce Luteinising Hormone (LH) release synchronising ovulation of the new dominant follicle.

Treatment	Details	Result
T-1	Ovsynch protocol	10 buffaloes have come to heat after treatment and not conceived
T-2	Use of mineral mixture	Only one animal has come to heat.

Refinement: Administering 'Ovsynch Plus' in buffaloes

In view of the poor results with the Ovsynch protocol in our trial, a modified 'Ovsynch Plus' protocol was tested in 10 anoestrus buffaloes for fertility improvement.

The Ovsynch Plus Protocol is a variation of the Ovsynch protocol. This treatment incorporates the use of equine Chorionic Gonadotropin (eCG), which is a hormone injected to stimulate follicle growth. Studies showed a significant increase in first service conception rates compared to the traditional Ovsynch protocol (31.9% VS 24.6%).

Protocol

- 1. Before 3 Days: eCG (Folligon) 400 units**
- 2. Day 0: 2.5ml GnRH (Gonadotropin-Releasing Hormone)**
- 3. Day 7: 5 ml PGF_{2α} (Prostaglandin F_{2α})**
- 4. Day 9: 2.5ml GnRH**
- 5. AI on 9th&10th Day**

After a preliminary check up to rule out infections or pregnancies, the animals were subjected to Ovsynch Plus protocol for induction of oestrous followed by fixed time AI at 12 and 24 hours after the last GnRH injection. Animals which returned to oestrous after treatment were bred either by natural mating or AI. The results of the trial showed that 6 out of 10 buffaloes were declared pregnant (60%). In the other group of 10 buffaloes which were not treated with the protocol, only 2 (20%) animals have conceived.

Therefore, the Ovsynch Plus program will improve pregnancy rates in buffaloes, and is consistent with other work suggesting the effect of eCG may be greater in herds where other risk factors for reduced fertility are present. It makes the use of a combination of eCG (Folligon) and GnRH - PGF_{2α}-GnRH injections which reported to have considerably narrowed down the ovulation time to a range of 24 hours to achieve the maximum conception rate with set time artificial insemination.

Particulars	Ovsynch Plus	Feeding mineral mixture (FP)
Cost of treatment	Rs. 3, 000/- (for 10 buffaloes)	Rs. 1, 500/- (for 10 buffaloes)
No. of buffaloes conceived	6	2
Conception rate	60%	20%
Gross income (approx.) Assuming cost of pregnant buffalo @ Rs. 30,000	Rs. 1,80, 000/-	Rs. 60, 000/-
Net income	Rs. 1, 74, 000/-	Rs. 58, 500/-

In this trial the conception rate was 60% and the Ovsynch Plus was found to be better as the conception has enhanced by 300% over the FP. The Ovsynch Plus protocol for improving fertility in buffaloes holds promise because

- It can induce cyclicity in anoestrus animals
- Fixed time A.I. can be performed to avoid the necessity of oestrus detection which is a serious limitation in buffaloes and
- Enhanced fertility in rural anoestrous/repeat breeding buffaloes through increased conceptions and/or inducing cyclicity.



Impact/Farmers'feedback

- Net returns are very high as the cost of pregnant buffaloes is twice the cost of non-pregnant one.

- Administering this protocol is an easy process because local livestock personnel can do it.
- Farmers desired that animal camps be conducted specially for oestrous management.

Introduction of dual purpose goat breed 'Osmanabadi'

Nature of Problem:

Low net returns from the local goats due to less population build up, poor milk yield, low dressing percentage.

Intervention:

Introduced goats of dual purpose breed 'Osmanabadi'.

The 'Osmanabadi' goat is native breed of Marathwada region of Maharashtra. It is medium to large size with coat colour mainly black (75%) and rest are of white, spotted or brown. It has high degree of disease resistance and capable of surviving in drought conditions. This goat breed is useful both for meat and milk. Average daily milk yield varies from 0.5 to 1.5 kg for a lactation length of about 4 months. Males grow up to 34 kg and females 32 kg. The dressing percentage is about 40-50.

On an average 1.5 kids are born from each Doe.

Observations

- Well adapted to East Godavari climate.
- Meat quality was good and have consumer acceptance.
- No major diseases were observed
- The average weight was 20 kilograms at the time of purchase
- Adults attained 33 kg
- They were well adapted to grazing and thrived on marginal lands.
- Milk production was 1.2 litres per day.

Particulars	Osmanabadi goat	Local goat
Milk yield/day	1.2 litres.	0.5 litres.
Adult body weight	Male: 32-36 kg Female: 30-32 kg	Male: 30-32 kg Female: 28-30 kg
Population build up	6 number (average) (Avg. body weight 22 kg)	4 number (average) (Avg. body weight 20 kg)
Cost of pair of kids (approx. 10 kg body weight each)	Rs. 5, 000/-	Rs. 5, 000/-
Cost of rearing (@ Rs. 125 per goat per month)	Rs. 6, 000/-	Rs. 4, 500
Gross income (approx.) Based on the Price @ Rs. 250/- per kg live body weight	Rs. 33, 000/-	Rs. 20, 000/-
Net income	Rs. 22, 000/-	Rs. 10, 500/-
BCR	3.0	2.1



Impact/Farmers' feedback

- Rearing Osmanabadi goats is remunerative compared to local goats.
- However, farmers prefer Black Bengal breed when compared to Osmanabadi because the black Bengal is more prolific than Osmanabadi.

ABBREVIATIONS

A.I.	:	Artificial Insemination
BCR	:	Benefit to Cost Ratio
BLB	:	Bacterial Leaf Blight.
BPH	:	Brown Plant Hopper
DAS	:	Days After Sowing
eCG	:	equine Chorionic Gonadotropin
GnRH	:	Gonadotropin-Releasing Hormone
PGF_{2α}	:	Prostaglandin F _{2 Alpha}
FP	:	Farmers' Practice
YMV	:	Yellow Mosaic Virus



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