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## Novel Technology to Protect Groundnut Crop from Neel Ghai and Wild Boar

Vertebrate pest, neel gai (blue bull) and wild boar are serious threat to groundnut cultivation in Saurashtra region of Gujarat. Neel gai prefer the foliage, wild boar eats the immature and mature pods of groundnut. Efforts were made to protect the crop from these wild animals. Field survey was conducted under the NICRA Project-Phase II during the rabi-summer 2018. We found that the famers of Supedi village, Uplata taluk adopted flash light technology to scare the animals during

night. This technology works with LED flash light rotating at clock wise and anti-clock wise at 360° providing 100 percent protection of crop from above animals.

The LED flash light 12 Watts fitted at opposite site was mounted on the PVC pipe at 1-2m height powered by either battery or by electricity (Fig. 1). In the technology, two units are required for one hectare area. The cost per unit is worked to be rupees 400.



Fig: Rotating flash-light installed in the farmers field

**Inputs: Rahul P Solanki, Hadik C. Vekariya, Thirumalaisamy PP, Harish G, Meena HN and Ram Dutta**

## CONFECTIONERY GROUNDNUT- OPPORTUNITIES FOR FARMERS

Groundnut or peanut (*Arachishypogaea* L.) is an annual legume of indeterminate growth habit and it's primarily grown for its high quality edible oil (44–56%) and easily digestible protein (22–30%) in its seeds. Groundnut seeds also contain carbohydrates (10–25%), a rich source of vitamins (E, K, and B complex), minerals (Ca, P, Mg, Zn, and Fe), and fiber. It is utilized directly as food or used in confections. The use of edible large/bold seeded groundnut kernels is generally referred as confectionery, and Hand Picked Selection (HPS) groundnut. Globally 50 per cent of groundnut produce is used for oil extraction, 38 per cent for confectionary use and 12 per cent for seed purpose. In India, about 80 per cent is used for oil extraction, 11 per cent as seeds, 8 per cent as direct food and one per cent for export to other countries (Sharma et al., 2017).

Edible groundnuts are consumed or utilized in a variety of ways. Important among them are peanut butter, roasted and salted kernels, preparation of candies and kernels are flaked as cake or biscuit decoration. Apart from the above uses, HPS groundnut is also recently used in the preparation of protein concentrates and protein isolates. Quality requirements of HPS groundnut largely depend on the end use of the commodity. Quality requirements for HPS groundnut kernels are cleanliness, fully developed, regular and uniform shape, pink/light brown colour, tender and crisp kernel with relatively soft

texture, nutty and sweetflavor, ease of blanching (>60%),moisture content of 5%, <1% free fatty acid (FFA) content, aflatoxin free(below 5 ppb), greater proportion of sound mature kernels (SMK), 100 seed weight exceeding 55 g, >11% of sugar content, high O/L ratio, high protein (>30%) and low oil content (<45%). Since oil content affects cooking time, it is important only when groundnuts are used for roasting. Seed mass is another important attribute to confectionary quality; however like yield and yield parameters, it is highly influenced by environment. The taste and sensory attributes of roasted groundnuts are associated with carbohydrate components of the kernel. Seed colour and shape and flavor are the other important confectionary attributes. Blanchability is removal of testa or seed coat (skin) from raw or roasted groundnuts and this attribute is of economic importance in processed groundnut food products, which include peanut butter, salted groundnuts, candies, and bakery products and groundnut flour. The premium price for the export quality of confectionery groundnut was high compared to normal produce. There are many varieties having most of the useful confectionery traits like BAU 13, GJG- HPS-1, TKG 19 A, ICGV 86564, GG 20, Birsra Bold 1, ICGV 92206, ICGV 90173, Somnath and Mallika which can be cultivated as confectionery groundnut at target locations.



**Chikki**



**Chocolate bar**



**Peanut Butter**



**Roasted kernels**



**Candies**

*Various products obtained using confectionery groundnut*

*Inputs: Praveen Kona, Gangadhara, K.*

*Photo Courtesy: Google Images*

## Paired sowing gives more yield of late sown Spanish group groundnut varieties in black soils

Under conditions of late onset of monsoon, short duration Spanish group groundnut varieties are preferred over long duration Virginia group varieties which yield better under early sown conditions. Spanish group varieties yield higher under closer spacing (30 x 10 cm) but farmers resort to wider spacing (45 x 10 cm) to facilitate mechanical interculturing resulting into lower yield due to less than optimum plant stand. Interculturing is particularly a must in black soils to loosen the soil to

facilitate peg entry into the soil besides, for timely and economical weed control, and soil moisture conservation. Therefore, there lies a challenge to identify suitable crop geometry, for late sowing of Spanish group groundnut varieties, which ensures optimum plant population as well as facilitates mechanical interculturing. Keeping in view above a field experiment was conducted during *kharij* 2015 and 2016 to identify suitable crop geometry for Spanish group groundnut variety TG 37A. Based on

facilitate peg entry into the soil besides, for timely and economical weed control, and soil moisture conservation. Therefore, there lies a challenge to identify suitable crop geometry, for late sowing of Spanish group groundnut varieties, which ensures optimum plant population as well as facilitates mechanical interculturing. Keeping in view above a field experiment was conducted during *kharif* 2015 and 2016 to identify suitable crop geometry for Spanish group groundnut variety TG 37A. Based on pooled results of two years it was found that paired row sowing at 45/10x10 cm being at par with 30x10 cm spacing gave significantly higher pod yield over 45x10

cm spacing (Figure1). While significantly higher haulm yield was obtained with 30x10 cm, 45/10x10 cm, 45/15x10 cm, and 45/20x20 cm spacing over 45x10 cm spacing. Besides, in paired row sowing cost of production also comes down due to economical weeding through mechanical interculturing as compared to manual weeding in closer spacing of 30 x 10 cm spacing. Therefore, under late sown conditions of Spanish group varieties in black soils, paired row sowing at 45/10 x 10 cm spacing may be promoted to get higher yield and reduce cost of cultivation as compared to closer sowing at 30 x 10 cm spacing.



Figure : Groundnut crop sown at 30 x 10 (left), 45 x 10 (center) and 45/10 x 10 cm (right) spacing

*Inputs: Ram A. Jat, P.V. Zala, and Rahul Solanki*

## Zn Biofortification in groundnut to alleviate Zn malnutrition

Zinc (Zn) is an essential nutrient for human health, and about 50 % of Indian population are at the risk of its deficiency mainly due to consumption of low Zn food crops grown on Zn deficient soils. Biofortification of Zn in seed through mineral fertilization, breeding and selection for high grain Zn density crop genotypes can offset Zn malnutrition. Groundnut is a good source of Zn with its average concentration of 45 mg kg<sup>-1</sup> in germplasm and breeding lines; and 57 mg kg<sup>-1</sup> in cultivars. A number of cultivars and germplasm lines were analysed for Zn in their seed over years and seasons where the Zn content in seed varied with seasons as well genotypes. In a study at ICAR-DGR, analysis in more than hundred groundnut

cultivars showed that the Zn content varied 22-94 mg kg<sup>-1</sup> with a mean value of 51 mg kg<sup>-1</sup>. Few cultivars were identified having > 63 mg kg<sup>-1</sup> seed Zn content were TKG 19A, BG 3, Somnath, ICGV 86590, M 145, M 197, M 13, CO 1, B 95, Tirupati 3, Gangapuri, CO 2, KRG 1, CSMG 884, GG 7, and TAG 24. Further, foliar application of zinc sulphate has reported to increase about 22 % seed Zn in groundnut, hence can be recommended in the package of practice for groundnut cultivation. The identified high Zn density groundnut cultivars need further validation for extensive cultivation and consumptions as food to combat the Zn malnutrition in rural India.

*Input: AL Singh, Sushmita and SK Bishi*

## Management of phosphate fixation in calcareous soils of Saurashtra

In arid and semi-arid regions, intense calcium phosphate fixation by adsorption and precipitation reactions reduce P availability due to formation of low-labile forms like dicalcium phosphates, octa calcium phosphates and finally hydroxyapatites. Adsorption reaction occur at low P concentrations and precipitation reactions occur at high P concentrations. More than 90% of the added P is fixed or precipitated, and only little of it enters soil solution which

is taken up by crops. P fixation is influenced by many factors like total amount of lime (CaCO<sub>3</sub>) and its effective surface area, Clay (%), Soil pH, Organic matter (%), root/soil contact, mineralization /immobilization and management practices. P deficiency in groundnut cause stunted growth with shortened internodes and poor root systems.

## Control measures

- Split-dose and band application of phosphate fertilizers
- Agronomic approaches like integration of P mobilizing plant species as inter-crops or in rotation. Oilseed rape, Lupinus albus and maize exploit less-labile forms of phosphorus from soil and make it available to subsequent crops
- Use ammonium phosphates (mono and di ammonium phosphates (MAP & DAP)), which reduce soil pH at the point of applications and make more P available to plant

- Controlled release with protective coating of granulated fertilizers
- Use of phosphate solubilizing microbes or consortia for seed treatment
- Application of Organic matter (FYM @ 10 t/ha), which help in retaining added fertilizer P through cation bridges (clay-cation-phosphate) and its subsequent release and availability to plant

**Inputs: KK Reddy, RA Jat**

## Celebration of world Soil day at ICAR-DGR

The world soil day celebrations were conducted with pomp in ICAR-DGR on 5<sup>th</sup> December 2017 with the participation of farmers, scientific, technical, administrative and SSS staffs. The program started with the registration of farmers along with distribution of kit and pamphlets (Gujarati language) titled “Soil health card and its effective use”. The



program was given a wide publicity by hoarding of banners at DGR entrance and quarter gates and exhibit of posters/campaign material given by Food and Agricultural Organisation (FAO). Farmers from nearby villages attended the program. Dr RA Jat, Senior Scientist (Agronomy), in his introductory remarks emphasized the importance of soil for farming community in the present era and explained the theme of world soil day celebration 2017 “Caring for the planet starts from the ground”. Then, a video given by DAC, Ministry of Agriculture on success of distribution of soil health cards was shown to farmers. The Director DGR, expounded that soil health cards can clearly make a visible change in the farm productivity and farm income provided it is flawlessly/accurately made and tailored to advise crop, season and soil specific recommendations to the farmers.

**Input: Kiran Reddy**

## Independence Day Celebrations

The country's 71<sup>st</sup> Independence Day was celebrated at ICAR-DGR with great enthusiasm and gaiety on August 17, 2017. Dr. Radhakrishnan T, Director, ICAR-DGR hoisted the national flag and addressed the staff.

## Swachh Bharat Abhiyan

The “Swachhta Hi Sewa” cleanliness campaign was organized at ICAR-DGR during 15<sup>th</sup> Sep- 2<sup>nd</sup> Oct, 2017. This cleaning drive was coordinated by an Institutional committee under the chairmanship of Dr. H. N. Meena. The programme was initiated with Swachhata Shapath by all the staffs, followed by a brief explanation about the cleanliness drive by the committee members. A detailed plan of work for the entire duration of the campaign was prepared and the date-wise activities were subsequently undertaken. All the staffs of the directorate actively participated in the drive and gave their contributions to make the office premises and the adjacent areas clean. Further, uprooting of weeds, grasses and un-decomposed wastes was also done by the staff members. Tree plantations were done along with pruning of existing trees and subsequent cleaning in the campus. A day was dedicated for celebration of “Samagra Swachhta Diwas” in which the staff members were taken to Ivnagar village where awareness related to proper toilet facility as well as overall hygiene was created among the village people. Another day was celebrated as 'Sarwatra Swachhta' where in Bhavnath was visited by the staff members and the entire area was actively cleaned. The staff members were also taken to Wellington dam where they gave their active contribution to clean the entire area. An essay competition was organized during the fortnight campaign, the awards for which were distributed on the last day. Finally the programme was concluded with prize distribution among the staff members who gave their best contribution during the entire programme of “Swachhta Hi Sewa”.



**Inputs: Dr. Sujit K. Bishi and Dr. Sushmita**

## हिंदी दिवस

राजभाषा कार्यान्वयन समिति की बैठक में हुए निर्णय के तहत इस निदेशालय में 14 सितंबर 2017 को हिन्दी दिवस मनाया गया। इस दौरान “राष्ट्र निर्माण में हिन्दी का योगदान” विषय पर निबन्ध लेखन प्रतियोगिता का आयोजन किया गया।

हिन्दी दिवस का उदघाटन समारोह दोपहर 2:30 बजे

सम्मेलन कक्ष में राजभाषा कार्यान्वयन समिति के माननीय अध्यक्ष एवं निदेशालय के निदेशक महोदय द्वारा किया गया। उन्होंने अपने स्वागत भाषण में राजभाषा के महत्व, उपयोगिता तथा सरलता को सभी कर्मचारियों के समक्ष साझा करते हुए, अधिक से अधिक हिन्दी में कार्य करने के लिए प्रेरित किया।

**Inputs: Lokesh Kumar**

## Groundnut Farmers Mela cum Exhibition

ICAR-Directorate of Groundnut Research, Junagadh with the support of NMOOP organized a Groundnut Farmer Fair cum Exhibition on 07<sup>th</sup> October 2017 at Arid Region Campus of CSWRI at Bikaner. On this occasion Dr. RS Paroda, Honorable Ex-Director General, ICAR and Secretary DARE was the Chief-Guest and Dr. BR Chhipa, Honorable VC, SKRAU was the special guest of this function. Dr. RS Paroda released a leaflet on “Integrated management of white grub in groundnut”. He emphasized on the importance of availability of quality seed and farmer adoption of new technology for the better productivity and management of white grub in groundnut. He further appreciated the efforts of Director, and his team for organizing kisan mela at Bikaner. With more than 600 farmers from 20 villages, demonstration of 20 exhibits by nearby ICAR institutes, SAUs, dealers and companies of seed, insecticides and pesticides, made the the mela a grand success.

**Input: Dr. Narendra Kumar**



## SAS training programme conducted at ICAR-DGR

A three day in-house training programme on 'Using Statistical Methods for Agricultural Research through SAS Programme' was successfully organized during 14-16 September, 2017 at ICAR-Directorate of Groundnut Research, Junagadh. A total of 24 participants including scientists, technical officers and research scholars have participated in the programme. Dr Suseel Sarkar and Sh. RS Tomar were invited from IASRI, New Delhi as resource persons. During the two days programmes, hands on training on SAS software installation, basics of statistics, uses of SAS programme for statistical computation, design of experiments and their subsequent analysis and interpretation by using SAS programme was imparted. Further, the use of SAS enterprise guide and Indian NARS Statistical Computing Portal were elaborated by the resource persons. The training was highly appreciated by the Director and the trainees. The director congratulated the training coordinating team Dr Ram A Jat, Dr Sujit K Bishi and Dr Kiran Reddy for arranging and making the training successful.

**Inputs: Sujit K Bishi, and Kiran Reddy**

\* A three-day farmers training programme on “Orientation-cum-training programme on Hybridization techniques in groundnut” for AICRP-G centres was organised from August 17-19, 2017 at ICAR-DGR, Junagadh.

## ICAR-DGR celebrates Agricultural Education Day

The ICAR-Directorate of Groundnut research, Junagadh celebrated Agricultural Education Day on 4<sup>th</sup> December 2017 in the memory of Dr Rajendra Prasad Ji, our first agriculture minister and First President of Independent India. A number school students have participated in the programme.



## Institute Seminars

Title	Name of the Speaker	Date
High temperature stress tolerance in peanut: superior physiological adaptive strategies and rapid induction of heat shock proteins (HSP's)	Dr. Sujit Bishi	22 July 2017
Genetic variability for fresh seed dormancy in Spanish advanced breeding lines of groundnut	Dr. Narendra Kumar	28 November 2017
Orientation programme	Dr. Praveen Kona	28 November 2017
Leaf blight and wilt disease of groundnut caused by <i>Fusarium polytorosium</i> in Rajasthan	Dr. Thirumalaisamy	30 November 2017
ICT applications for groundnut farming	Dr. V.V. Sumanth Kumar	30 November 2017

## Participation in Conference/Workshop/Seminar/Symposium/Training programmes

Name	Programme	Venue	Date
Dr. Narendra Kumar	XII <sup>th</sup> Annual Review Meeting of ICAR Seed Project	MPKV, Rahuri	29-30 July 2017
Dr. Kona Praveen	Orientation Training Programme	ICAR-DGR, Junagadh	25-28 November 2017
Dr. Ajay BC	Training on "Multivariate Data Analysis"	ICAR-NAARM, Hyderabad	14-20 December 2017
Dr. Sujit Bishi	Summer school training on "Phenotyping of drought adaptable physiological traits in different crops"	GKVK, Bangalore	25 <sup>th</sup> October-15 <sup>th</sup> November, 2017
	seminar on "Recent trends and techniques in genomics and proteomics for agriculture"	JAU, Junagadh	12 October 2017
Dr. Ram Dutta	MDP on Science, Technology and Society at National Institute of Advanced Studies	IISC, Bangalore	11-22 December 2017
Dr. Thirumalaisamy	NICRA workshop	NCIPM, New Delhi	13 October 2017

## Personnel

### DGR bids farewell



**Shri. D.M. Bhatt**  
(T-9) retired after serving 34 years at the institute on 31.07.2017



**Shri. A.M. Vakhariya**  
(T.O.) retired after serving 36 years at this institute on 30.11.2017

### New Joining



**Dr Praveen Kona**  
Joined at this institute on 13.10.2017 in the position of Scientist (Plant Breeding) after completing 106th FOCARS training at NAARM

### Transfers



**Dr RS Yadav**  
Sr. Scientist (Soil Science) was relieved from this Directorate on 07 July 2017, upon his transfer to ICAR-CAZRI, Jodhpur, Rajasthan



**Dr Abhay Kumar**  
Scientist (Biotechnology) was relieved from this Directorate on 07 July 2017, upon his transfer to ICAR-NRCL, Muzaffarpur, Bihar



**Dr Murlidhar Meena,**  
Scientist (Agril. Economics) was relieved from this Directorate on 07 July 2017, upon his transfer to ICAR-NRCSS, Ajmer, Rajasthan

## PHOTO GALLERY



**Farmer's visit at ICAR-DGR**



**White Grub-An emerging threat to groundnut growers**



**State officials visiting the physiology lab**



**Delegates from Odisha trying to learn groundnut crossing programme**