



CIAH

NEWSLETTER



ICAR-Central Institute for Arid Horticulture

Beechwal, Bikaner-334 006, Rajasthan

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VISIT OF DEPUTY DIRECTOR GENERAL (HORTICULTURE SCIENCE), ICAR, NEW DELHI TO REGIONAL STATION OF THE INSTITUTE, CENTRAL HORTICULTURAL EXPERIMENT STATION, GODHRA (GUJARAT)



Dr. N.K. Krishna Kumar, Hon'ble Deputy Director General (Horticulture Science), ICAR, New Delhi visited Regional Station of the Institute, Central Horticultural Experiment Station, Godhra (Gujarat) on 6th July 2015 where he laid down the foundation stone of Scientist Home. This station was established in the year 1979 by the then Prime Minister Shri Morarjibhai Desai for development of dry land horticultural technologies for the welfare of tribal farmers of western parts of India covering the states of Gujarat, Rajasthan, Maharashtra and Madhya Pradesh. This station did not have any facilities for staying the Scientists during meetings and other scientific gatherings, even after passing of 35 years of its establishment. Due to the rigorous efforts of the DDG (Horticulture Science), Rs. 164 Lakhs were sanctioned for constructing Scientist Home at the station. Dr. S. K. Sharma, Director, ICAR-CIAH, Bikaner welcomed all the guests and apprised them about the achievements of the Station. Hon'ble DDG (Horticulture Science) called a meeting of the Scientists and discussed about the potential and future line of research work being carried out at the station. Dr. S. Rajan, Director, ICAR-CISH Lucknow, Dr. Jitendra Kumar, Director, ICAR-DMAPR, Boriavi, Anand, Dr. S.K.Sharma, Director, CIAH-CIAH Bikaner, Dr. P. R. Bhatnagar, Head, Indian Institute of Soil and Water Conservation, Regional Centre, Vasad, Dr. B.G. Bagle, Ex-Head, CHES, Godhra (Gujarat) were also present during the meeting. Hon'ble DDG suggested to develop Block- I as an

organic farming system for demonstration of the technologies developed by the Station. He also suggested to promote Goma Priyanka variety of jamun in different suitable agro-climatic zones of India and also emphasized to work on medicinal values of bael with large plant multiplication of Goma Yashi variety of bael for high density planting under rain fed conditions of western India. During field visit, Hon'ble DDG appreciated the management work of experimental blocks of different crops at the station.

RESEARCH SPECTRUM

1. At Bikaner

Digama hearseyana (Noctuidae: Lepidoptera) a new threat to karonda (Carissa carandus): For the first time, *D. hearseyana* was observed on Karonda tree at Bikaner. During the present study, the average incidence of *D. hearseyana* on trees ranged between 10.00 to 60.00 and 11.67 to 63.33 per cent during 2014 and 2015, respectively. The incidence and numbers of *D. hearseyana* were higher in 1st fortnight of July to 1st fortnight of September and the maximum incidence 60.00 and 63.33 per cent were recorded in 2nd fortnight of August and minimum in 2nd fortnight of October (16.67 and 18.33%) during 2014 and 2015, respectively. Thus, the highest mean numbers of *D. hearseyana* per tree were recorded in 2nd fortnight of August (5.77 and 5.97/ plant) followed by 1st fortnight of August (4.8 and 4.83/ plant) and the lowest was during 2nd fortnight of October (16.67 and 18.33/ plant) during 2014 and 2015, respectively.



Fig. Incidence of caterpillar, *Digama hearseyana*



Fig. Adult male and female of *Digama hearseyana*

The female was distinctly large than the male in respect to all body parts. The females laid eggs single on leaves. Eggs were blackish brown light in colour with 0.57 mm in length and 0.36 mm in width. The 1st larval instar was brownish black with 1.91 mm length and 0.35 mm width. The 5th instar larvae were 15.70 mm long, 2.19 mm wide, and light brownish in color with hairs on dorsal surface of the body. Adult females had body length upto genitalia of 12.07 mm and male of 11.28 mm. The lengths of male and female antennae were 7.60 mm and 9.03 mm, respectively (Dr. S. M. Haldhar).

Standardization of technologies for dehydration and value addition of karonda: *Karonda* (*Carissa carandas* L.) is richest source of iron mineral among the fruit crops and also good in calcium and vitamin C. Its unripe fruits which are sour and astringent in taste, are locally used for preparing vegetable, chutney and pickle. The storage life of *karonda* is very short because of its soft flesh and high moisture content. *Karonda* remains unexploited commercially owing to lack of standardized post harvest and value addition technologies. Therefore, an experiment was conducted for standardization of technology for dehydration and value addition of *karonda*. Unripe fruits are of small size (2.0 to 2.5 g with soft seed) and big size (4.0 to 4.5 g with hard seed) as a whole, slices of big size fruits with seeds and without seeds were used in the experiments. The treatments combination consist of control, with and without blanching (3 minute) and preservatives treatments of potassium meta bisulphate, citric acid and sodium benzoate each at 0.1 and 0.2 % concentrations for five minutes and dried with solar energy. Among all the treatments, small size unripe whole fruits (2.0 to 2.5 g) were blanched for 3 minute and treated with sodium benzoate 0.1 % was found superior for dehydration of *karonda*. These dehydrated fruits can be used as mouth freshener, preparing chutney, vegetable and *karonda* powder. Dehydrated *karonda* powder was found good in organoleptic taste for tartness and masala mixture for typical sour taste. (Sh. Ramesh Kumar, Dr. R.S. Singh, Dr. S.R. Meena and Dr. Pinaki Acharyya)



Fig. : Dehydration of *karonda* fruits for value addition

Changes in Physical and microbial properties of soil under different fruit based diversified cropping models :

Different cropping models viz., *Aonla-Ber*-Cluster bean-Fennel, *Aonla-Bael*-Cluster bean-Coriander, *Aonla-Khejri*-Cluster bean-Ajowain, *Aonla-Drumstick*-Cluster bean-Dill, *Aonla-Khejri*-Grass (*L. indicus*) were assessed for soil physical properties and microbial population, which are indicator of soil health. Soil samples were analyzed as per standard procedures. Maximum value of OC, EC, pH, was found under *Aonla-Khejri*-Cluster bean-Ajowain cropping model followed by *Aonla-Ber*-Cluster bean-Fennel. The higher values in *aonla* involving *ber* and *khejri* could be due

to synergistic crop interaction. Maximum water holding capacity at 0.33 and 6% bar was observed under *Aonla-Ber* (2.28 and 1.10%) followed by *Aonla-Khejri* (2.07 and 1.03%), *Aonla-Bael* (2.44 and 0.99%), *Aonla-Karonda* (1.76 and 0.61%) and *Aonla-Morianga* (1.84 and 0.56%). Higher bacterial, fungal and actinomycetes population ($271 \text{ cfux}10^6$, $221 \text{ cfux}10^5$ and $116 \text{ cfux}10^3$) were observed in *Aonla-Khejri* followed by *Aonla-Ber* ($205 \text{ cfux}10^6$, $164 \text{ cfux}10^5$ and $105 \text{ cfux}10^3$), *Aonla-Bael*, *Aonla-Karonda* and *Aonla-Moringa*. Physical and microbial properties of soil improved more under cropping model *Aonla-Khejri*-Cluster bean-Ajowain followed by *Aonla-Ber*-Cluster bean-Fennel (Dr. M.K. Jatav, Dr. H. Krishna, Dr. S.R. Meena and Dr. R. Bhargava).

Occurrence of major diseases in ridge gourd under field conditions:

Ridge gourd variety '*Thar Karni*' was sown on 23rd July, 2015 at Pathology Block of this Institute to assess the occurrence of major diseases on the variety. All the cultural practices were done during crop season. No control measures were applied in the crop. Mosaic disease was one of the major diseases occurred during rainy season of this year under field conditions. Most characteristic disease symptoms were found on leaves of the plants. Affected leaves exhibited mosaic type symptoms accompanied by blistering green areas. Leaves were variously deformed and reduced in size. Infected plants were stunted and fruit yield was affected. This disease was caused by virus strain. Disease incidence of mosaic symptoms was found up to 20.0%. (Dr. S. K. Maheshwari)

'Thar Karni' variety of ridge gourd identified:

The Institute identified a variety of ridge gourd named as *Thar Karni*. It is early in harvesting and takes 51-55 days to first picking from sowing. Fruits are 20-25 cm long weighing 90-110 g and cylindrical with 10 longitudinal shallow ridges. Plants bear short internodes, profusely branched and high yielding suitable for cultivation during spring-summer and *kharif* season (Dr. B.R. Choudhary).



Fig. : Fruits of *Thar Karni*

Cultures of date palm cv. Halawy and Khalas : The cultures of date palm cv. Halawy and Khalas of different stages such as callus, embryogenic callus and germinated somatic embryos were grown and their periodical sub-cultures in different media compositions containing NAA and BA at different levels on agar solidified media with and without activated charcoal were obtained. The germinated embryos were isolated and transferred in test tubes for further root development. The well rooted plants were also transferred in pots containing media composition of cocopeat and vermiculite and sterilized soil and kept primarily in culture room at $28 \pm 2^\circ\text{C}$ and maintained humidity by covering plants with transparent polypropylene bags. (Dr. Dhurendra Singh and Dr. P.N. Sivalingam)

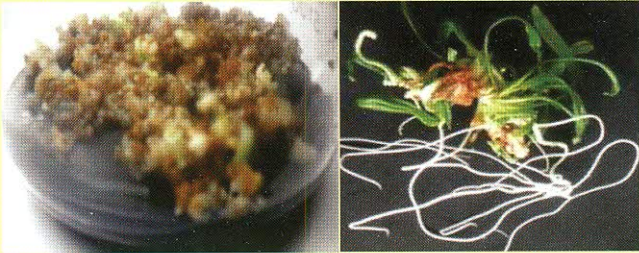


Fig. Embryogenic callus

Fig. Germinating somatic embryos

Production & demonstration of tissue culture raised plants: Under a network project on “Production & Demonstration of tissue culture raised plants under three locations & collection & maintenance of elite germplasm of date palm” 180 date palm tissue culture plants of cv. Barhee from Anand Agricultural University, Anand received for field evaluation at CIAH, Bikaner during December, 2015. The observations recorded with respect to plant height, number of opened leaves per plant and canopy of date palm plants during December 2015 for earlier supplied date palm tissue culture plants of local elite genotype. One group of date palm tissue culture plants local genotype (25) planted during July 2013 attained average height of 165 cm, spread of 2m radius and 22-28 opened leaves. Another group (133) planted during October 2014 attained average height of 65 cm, spread of 70cm radius and 13-15 opened leaves. The field establishment in all plants was more than 96 per cent (**Dr. Dharendra Singh and Dr. P.N. Sivalingam**).

Citrus plantation at CIAH research farm : The orchard of citrus was established with diverse commercial cultivars and rootstock species in five hectares at CIAH research farm during October 22 to 02 November, 2015. These all planting material was collected from different certified source of Government organizations in India. Total 1190 plants of different Citrus species namely sweet orange varieties, Blood Red (200 plants), Washington (100), Hamlin (100), New Hall Navel (100 plants), Sathgudi (100) and

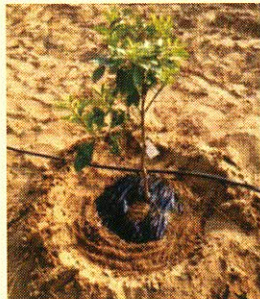


Fig. Citrus plant

Jaffa (100 plants); Lime variety Baramasi (200 plants) and Vikram (50 plants); lemon viz., Baramasi lemon grafted (200 plants) and Badri lemon (20 plants); and Kinnow (20 plants) along with seven rootstocks species i.e. Troyer Citrange, Pectinifera, Rubidox, Kharna Khatta, Rangpur Lime, Carrizo and Rough Lemon with 15 plants each were planted. Hundred per cent plants are well in survival condition and no damage from frost or other environmental factors was observed. Initial observations related to survive per cent, new flashes behavior, other growth parameters are in progress (**Sh. J. S. Gora and Sh. R. Kumar**).

Utilization of ridge gourd breeding material for screening against abiotic and biotic stresses of hot arid agro-climate: Realizing the potentials of ridge gourd, germplasm collection and evaluation was started from 1996

at Bikaner, and based on purification of breeding material up to 2008, twenty lines were generated and stored under 20^o deep freeze facilities for utilization in improvement programme. During rainy season of 2015, these were studied for germination, plant growth and yield component

characters under maintenance using years old seed material of 4th generation cycle. The material was studied in reference to high temperature and abiotic stresses, fruit fly infestation and viral diseases to screen out the potential lines based on field tolerance and trait specific quality for marketable fruit yield under



Fig. Fruits of purified 10 line AHRG 15-4-1

hot arid agro-climate. The evaluated material exhibited variations and scope for improvement for the characters such as days to appearance of first male flower (37.52 46.86 DAS), days to appearance of first female flower (42.34 52.23 DAS), days to first harvesting of tender fruits (45.65 62.24 DAS), fruit weight at marketable stages (35.67 158.43 g), fruit length (16.56 37.24cm), fruit diameter (2.17 4.12 cm), number of marketable fruits/ plant (1.63 7.41), marketable fruit yield/plant (0.085 0.776 kg), vine length (1.64 3.04 m) and fruit fly infestation (18.53 55.14 %). The purified line AHRG1541 (segregating material from *Luffa acutangula* x *Luffa hermaphrodita*) exhibited potentialities for multiple stress tolerance and marketable fruit quality yield (**Dr. D. K. Samadia**).

New concept of vertical vegetable farming in hot arid region:

Leafy vegetables which forms an important constituent of diet is lacking among the cuisine of the rural masses residing in arid regions. Besides, as most of the leafy vegetables do grow well under hot and humid climate, it has become imperative to search for a model that can suffice the needs of the dry and arid tracts and it seems that vertical cultivation of leafy vegetables and others under controlled environment conditions can be a good start up venture. In our initial study, we have identified and introduced some leafy vegetables like basella (*Basella alba*), amaranthus (*Amaranthus* species), thornless vegetable cactus (*Opuntia ficus-indica*) and sweet type Aloe vera (*Aloe barbadensis*), a sort of mix and match of sensitive and hardy crops which are complemented for their enriched nutritional components and phytochemicals. The vegetables were grown in pots and trays of requisite size in multitier racks so as to accommodate more number of plants as well as to raise the productivity per unit area. Temperature, humidity and light regimes were controlled in tandem on a day to day basis manually inside the green house to keep the environmental parameters constant. Present use of other vegetables and the model's feasibility on long run are being studied (**Dr. P. Acharyya, Dr. D. Singh, Dr. M. K. Jatav and Dr. S. R. Meena**).



Site specific nutrient management for *kachri* production: Site-specific nutrient management (SSNM) strategies that include site and season-specific knowledge of crop nutrient requirements and indigenous nutrient supplies are required to increase productivity, yields and nutrient use efficiency. The SSNM provides an approach for need based feeding of crops with nutrients while recognizing the inherent spatial variability. A field experiment was conducted at CIAH research farm with popular *kachari* cultivars *AHK-119* in the kharif season to investigate the site specific nutrient management on *kachari* performance. The *kachari* crop received differential doses of NPK through inorganic fertilizers as per schedule of treatments. The seven manurial treatments involving NPK through inorganic fertilizer viz., 40, 20 and 20 kg/ha of NPK, 80, 40 and 40 kg/ha of NPK, 120, 60 and 60 kg/ha of NPK, 40 and 40 kg/ha of PK, 80 and 40 kg/ha of NK, 80 and 40 kg/ha of NP and without NPK (Absolute control) were replicated 3 times in a randomized block design. Nitrogen dose was applied in three splits i.e. 1/3rd at planting, 1/3rd at 25 days after sowing and rest 1/3rd 50 days after sowing from fertilizers. Phosphorus and potassium fertilizers were applied in furrows at the planting time as per treatment. Maximum per cent yield response was observed where 120, 60 and 60 kg/ha of N, P₂O₅ and K₂O was applied (95.88%) followed by 80, 40 and 40 kg/ha of N, P₂O₅ and K₂O (81.63%) and 80 and 40 kg/ha of N and P₂O₅ (77.89%) as compared to control. (Dr. M. K. Jatav, Dr. B. D. Sharma, Dr. D. K. Samadia and Dr. S. R. Meena)

Refinement/standardization of traditional technologies:

During the reported period, some of the traditional technologies/ideas related to value addition and production of arid fruits and vegetables were collected, and initiatives of their technological refined / standardization were under taken. Important



Fig. : Pickle of date fruits

technologies refined/standardized were: preparation of pickle of date fruits, cactus pear and *ker* fruits, ice-cream of date fruits, dry slice of snapmelon and *kachri*. (Dr. S. R. Meena, Dr. B. D. Sharma and Dr. S. K. Maheshwari).

Collection of promising germplasm: During the reported period, 02 promising germplasm of cactus and 01 promising germplasm of cucurbit were collected for testing, multiplication and conservation (Dr. S. R. Meena, Dr. B. D. Sharma and Dr. D. Singh).

2. At Godhra (Gujarat)

CHESM-10: A promising genotype of *Mahua*: The selected genotype of *Mahua* was propagated through soft wood grafting and tested under field conditions for 10 years (2005-2015). This selected genotype of *Mahua* performed in respect of flowering pattern, fruiting and fruit quality attributes. It starts flowering in 5th year, regular bearer, ripens in month of June and recorded 29.00 g average fruit

weight, 14.26° Brix TSS. Fruit yield kg per plant was recorded 20.14 during 10th year of orchard life under rainfed conditions of hot semi-arid ecosystem (Dr. Sanjay Singh and Dr. A. K. Singh).



Fig. Flowering pattern in *Mahua* : CHESM-10



Fig. Fruiting pattern in *Mahua* : CHESM-10

EXTENSION ROGRAMMMES/ACTIVITIES

1. At Bikaner

Visit and interaction/ meetings at the Institute : During the reported period > 300 farmers, students and agricultural supervisors, officers, professionals, teachers, scientists/trainees, etc. were visited and interacted at the Institute.

Visit to farmer's fields and interaction/meetings: More than 22 of farmers' fields were visited. They were interacted and provided with desirable technical guidance / assistance to overcome their problems related to arid horticultural crop production.

Research-extension-farmers-interface meetings: During the reported period, 13 Research-Extension-Farmers-Interface Meetings were held with 13 groups of farmers during their exposure visit at the Institute. Moreover, 06 Farmer's Interest Groups /Commodity Interest Groups/ Self-Help Groups were also organised at the different sites/ locations/ villages of Bikaner district (Rajasthan).

Front line demonstrations/adaptive trials and farmers' school: During the reported period, two frontline demonstrations of each improved varieties of vegetable *crop* viz., *AHS-82* (*Snap melon*), (*Kachri*) and two frontline demonstrations of improved variety of *khejri* (Thar Shobha) were conducted on farmers fields. Two farmers' school on seeds production of improved varieties of *Kachri* (*AHK- 119*) and snapmelon (*AHS-82*) were organised during the rainy season (July - October) 2015. In addition, 11 method demonstrations about improved agro-techniques of arid fruits and vegetable production were given to visiting farmers/ extension functionaries or during farmer's field visits/ interaction.

Farmer's trainings: During the reported period, five training programmes (on/off campus) for farmers were conducted.

Organization of Technological Exhibitions : During the reported period, 02 exhibitions of improved technologies of arid horticulture were organized on the occasion of

celebration of Foundation Day of NRCC, Bikaner, at Lakhusar village of Bikaner district on 04.08.15 and during launching celebration of "Mera Gaon Mera Gaurv" scheme at Kalasar village village of Bikaner district on 03.10.15

Providing technical literature: More than 250 copies of technical folders and bulletins (technical literature) were provided to the farmers /extension workers/ NGOs, during their visit, farmer's fair, exhibitions and meetings, etc.

Mobile advisory service/ ICT based/ e-extension based activities: During the reported time, various farmers were answered & guided using mobile service, online telephonic conversation to solve their existing problems related to horticultural crop production. Some advance farmers were rendered technical guidance through e- mails. Besides, other activities included Institute's film show on computer system/ TV for client's knowledge, production of online (Institute's website) technological news through six monthly news letter, providing CD/DVD of the Institute's film and other programmes to needy clients, etc.

Empowerment of farm women: To empower/ educate the farm women of the hot arid region about arid horticultural crop production > 200 farm women of local villages and visited to the Institute and had research- extension-farmers-interface meetings with them.



Fig. : Scientists of the Institute interacting with farm women about innovative arid horticultural technologies .

They were exposed to modern arid horticultural crop production technologies, value addition techniques of arid fruits and vegetables during their visits, exhibitions and off campus interactions, etc. (Dr. S. R. Meena, Dr. R. S. Singh, Dr. D. K. Samadia and Dr. D. Singh)

Organization/Celebration of days/ programmes.

Celebration of Agriculture Education Day: The Agriculture Education Day was celebrated on 22.07.15 at the Institute in which about 110 students and teachers from different schools of Bikaner participated.

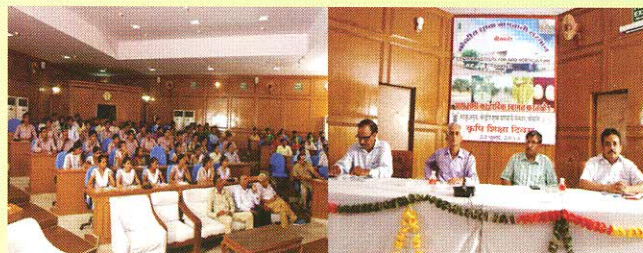


Fig. Chief Guest Dr. Rajesh Kumar Sharma, Director, IABM, SKRAU, Bikaner and Dr. S. K. Sharma, Director of the Institute interacting with participating students and teachers during celebration of Agriculture Education Day.

Celebration of Farm Innovators Day: The Institute celebrated the " Farm Innovators Day " at Sarayrupayat village of Bikaner district on 09.10.2015



Fig. : Scientists of the Institute interacting with participating innovative farmers during celebration of the " Farm Innovators Day "

Celebration of World Soil Day : The Institute organized the " World Soil Day " at Sarayrupayat village of Bikaner district on 05.12.2015



Fig. : Scientists of the Institute interacting with farmers during celebration of the " World Soil Day "

Celebration of ICAR Industry Day: The Institute celebrated "ICAR Industry Day" at Khara Industrial area, Bikaner on 18.12.2014



Fig. : Scientists of the Institute interacting with participating Industrialists during celebration of the "ICAR Industry Day"

Visit of VIPs/ Higher Dignitaries at the Institute

1. Dr. S. L. Mehta, Former Vice Chancellor (MPUAT, Udaipur), DDG (Education.), ICAR, New Delhi visited the Institute on 27-28 July, 2015
2. Dr. T. Janakiram, ADG (Hort.-I), ICAR, new Delhi visited the Institute on 27-28 July, 2015
3. Dr. B. B. Vashishtha, Former Director, NRCSS, Ajmer visited the Institute on 27-28 July, 2015
4. Dr. Y. N. Reddy, Former Principal, COA, ANGRAU, Hyderabad visited the Institute on 27-28 July, 2015
5. Dr. S. Lingappa Former, Director of Research, UAS, Dharwar visited the Institute on 27-28 July, 2015.
6. Dr. Rajesh Kumar Sharma, Director, IABM, SKRAU, Bikaner visited the Institute on 23.07.2015.
7. Sh. Dushyant Chautala, Member of Parliament and member of GB, ICAR, New Delhi visited the Institute on 04.10.2015.

Important Meetings held

- **RAC Meeting** : Research Advisory Meeting of the Institute was held during 27 - 28 July, 2015 under the Chairmanship of Dr. S. L. Mehta, Former Vice Chancellor, MPUAT, Udaipur and DDG (Education), ICAR, New Delhi.
- **ITMC meeting** : ITMC meeting was held on 8th September, 2015 under the chairmanship of Dr. S. K. Sharma, Director of the Institute.

Visits/meeting attended by the Director of the Institute.

Dr. S. K. Sharma, Director of the Institute monitored the work progress/ attended/ participated in the following meetings during the reported period

- Visited to regional station of the Institute CHES and KVK, Godhra, Gujarat to review their progress and to monitor the foundation stone laying ceremony of Scientist Home at CHES, Godhra w.e.f. 04-06 July, 2015.
- Attended a meeting of Departmental Promotion

Committee for the Career Advancement Scheme for a scientist as an expert nominated by Hon'ble Director General, ICAR, New Delhi on 28.09.2015.

- Attended the 2nd Hailstorm Task Force Meeting held on 21.11.2015 at ICAR- NRCG, Pune (Maharashtra).
 - Attended an Assessment Committee Meeting for CAS under the revised CAS for promotion from Senior Scientist to Principal Scientist on 17.12.2015 at ASRB, New Delhi.
 - Attended a meeting at New Delhi regarding celebration of "Golden Jubilee of Green Revolution in India" on 27.11.2015 as per kind invitation by President, NAAS, New Delhi.
- (b) Dr. S. K. Sharma, Director of the Institute visited the following AICRP centres/ H. Q. New Delhi and other places during the reported period
- Visited Abohar (Punjab) to assess the over all situation for establishing a Centre of the proposed PG Institute of Horticultural Research & Education, Abohar.
 - Visited University of Agricultural Sciences, Raichur regarding the possibilities for date palm cultivation from 04.10.2015 to 06.10.2015
 - Visited CHES, Godhra and KVK, Godhra (Gujarat) to monitor the technical, physical and financial progress especially ongoing construction of Scientist Home on 15.10.2015.
 - Visited AAU, Anand to monitor the progress of date palm tissue culture project on 16.10.2015.
 - Visited AICRP on Arid Zone Fruit Centre SK Nagar to monitor the progress of ongoing research programmes on 17.10.2015.
 - Visited Jadhavwadi Centre monitor the progress of AICRP on Arid Zone Fruits and project work including TSP activities on 2&3 November, 2015.
 - Visited to monitor the progress of AICRP on Arid Zone Fruits Rahuri Centre on 4 & 5 November, 2015.
 - Visited to monitor the progress of AICRP on Arid Zone Fruits Ambajogai Centre on 6 & 7 November, 2015.
 - Visited AICRP on Arid Zone Fruits Jabalpur Centre to monitor its physical, financial and technical progress on 26.11.2015.
 - Visited to monitor the progress of AICRP on Arid Zone Fruits Centre Faizabad on 6 & 7 December, 2015.
 - Visited ICAR Research Complex for North East Hill Region Umiam to explore the possibilities for strengthening arid fruits research and also exploring the possibilities for utilization of funds under tribal sub plan scheme w.e.f. 21-23 December, 2015.

HRD ACTIVITIES

Participation/attending the training programmes/ seminar/ symposium/ workshops, etc.

- Dr. S. K. Sharma, Director, ICAR-CIAH, Bikaner attended the workshop on "Fruit Cracking and Soil Health Management in Pomegranate" on 03.10.2015 at ICAR- National Research Centre on Pomegranate,

Solapur, Maharashtra..

- Dr. S. K. Sharma, Director, ICAR-CIAH, Bikaner attended the Fifteenth Working Group Meeting of AICRPDA and chairing Technical Session - III Progress of Cropping Systems Research in AICRPDA w.e.f. 24-26 December, 2015 at Biswanath Chariali.
- Dr. Dharendra Singh attended International Conference on vertical farming at Bengaluru during 2-3 November 2015.
- Dr. Hare Krishna along with Dr. S.K. Maheshwari and Dr. S.R. Meena organized 01-day off-campus farmer's training on 'Improved horticultural practices vis-à-vis arid fruit production' at village Sarayrupayat, Bikaner on 24.11.2015.
- Dr. S. K. Maheshwari is organized one day off campus farmer's training programme entitled: "Disease management of arid fruit crops" on 23-11-2015 at Bachhhasar village of the Bikaner district with the help of extension scientist Dr. S. R. Meena.
- Dr. Pinaki Acharyya, Sr. Scientist, attended the National Workshop on " Sustainable Ground Water Development and Management" organized by Department of Geology and Geo-Ventures, Govt. Dungar College, Bikaner and delivered a talk on " Closed Soilless Growing Systems" on 22nd December, 2015.
- Dr. Pinaki Acharyya, Sr. Scientist, attended the Winter School on " Advances in Improvement of Vegetable crops using biotechnological approaches" at Division of Vegetable Science, ICAR-Indian Agricultural Research Institute, New Delhi from 18th Sept-8th Oct, 2015.

PERSONALIA

Awards/Prizes/Recognitions

- Dr. Hare Krishan, Sr. Scientist, got *First Position* in poster presenting of a research paper during Hindi Awareness Week held at the Institute from 14 - 20 September, 2015.
- Dr. Hare Krishan, Sr. Scientist, got *Second Position* in a competition on research paper poster presenting (in Hindi) held at ICAR - NRCC, Bikaner in September, 2015.
- Dr. S. R. Meena was nominated as Nodal Officer on 13.08.2015 by the competent authority of the Institute for "Mera Gaon Mera Gaurav Scheme" of ICAR.
- Dr. S. K. Maheshwari got *third position* in "Hindi Samaanya Vyaakaran Gyaan Pratiyogita" held at ICAR- CIAH, Bikaner during Hindi Chetna Saptah held from 14 - 20 September, 2015.
- Dr. B. R. Chaudhary, Sr. Scientist, got *First position* in "Hindi Shabd Lekhan Pratiyogita" held at ICAR- CIAH, Bikaner during Hindi Chetna Saptah 14 - 20 September, 2015 September, 2015.
- Dr. Pinaki Acharyya, Sr. Scientist, was appointed as an *Editor* for the online journal " Open Agriculture" for Tropical Agriculture and Horticulture sections brought

out by De Gruyter Open, Warsaw, Poland in September, 2015.

- Dr. R. S. Singh, was nominated member of IMC of CAZRI, Jodhpur in September, 2015
- Dr S. R. Meena was awarded with *Bharat Shiksha Ratan Award* by the "Global Society for Health & Educational Growth" on 21st September, 2015 at New Delhi.
- Dr. S. R. Meena participated 4th Jammu and Kashmir Agricultural Science Congress and presented one oral paper and one paper through poster presentation in which his poster presentation was awarded with *Third Best poster award* during the above Congress held at SKUAST, Jammu during October 28 - 30, 2015.
- Dr M. K. Jatav, Senior Scientist received *Best Oral presentation award* in National Conference on Innovative Research in Agriculture, food Science, Forestry, horticulture, aquaculture, Animal Sciences, Biodiversity, Environmental Engineering and climate Change (AFHABEC-2015) organized by "Krishi Sanskriti" on 31st October and 1st November, 2015 at Jawaharlal Nehru University, New Delhi.
- Dr M. K. Jatav, Senior Scientist received *Young Scientist award* from Society for Scientific Development in Research & Technology in the month of December, 2015 at Gwalior (M.P)
- Dr. S. R. Meena was nominated as Nodal Officer on 16.12.2015 by the competent authority of the Institute for "Skill Development Programmes (ICAR)" in agriculture sector.

STEPS IN POPULARIZATION AND COMMERCIALIZATION OF TECHNOLOGIES: SUCCESS AND FEEDBACK.

Fruit based diversified cropping system for increasing income and generating employment for the farm families: A success story: In order to mitigate the potential risk of total crop failure under mono-cropping system under the fragile arid ecological conditions, crop combinations involving perennial fruit crops seem a promising proposition to get multiple outputs, which ensure production and income generation in a sustainable manner. With a view to suggest cropping systems, an evaluation of fruit based diversified cropping models integrating alternative crop components as under-storey fruit crop and ground-storey crops /spice and fodder crop were developed at this Institute. These cropping models/ systems involved arid fruit crops like *aonla*, *ber*, *bael*, *khejri*, drumstick, *karonda*, and *spices*, fodder crop, *sewan grass*, etc. The inter-spaces of orchards were used to grow arid vegetables like cluster bean, bottle gourd, *mateera* and seed spices during *kharif* and *rabi* seasons, respectively in order to generate extra income and improve on-farm productivity. The income was found quite higher under multiple cropping systems than the sole crop. The inclusion of perennial fruit crops also helps improving soil fertility status by contributing litterfall. The available macro-and micro-nutrients contents in soil under trees growing in diversified pattern of cropping was considerably higher than that of the sole cropping. Additionally *aonla*, grown in

combination with other fruit crops, were found to contain higher content of antioxidants. Many farmers of the locality were visited to the Institute to create the knowledge and awareness about the economic viability and sustainability of the arid fruit based cropping system as developed by the Institute. The farmers were motivated and inspired by the Institute to adopt the suitable fruit based cropping systems on their fields. As a result, a progressive farmer Sh. Govind Ram Godara, 489 RDL, Sarehkunjiya village of Bikaner district (Rajasthan), inspired with these sustainable cropping systems / technology and he adopted fruit (*Aonla*, pomegranate, Kinnow, *Khejri*, *Lasoda*) based cropping system on his farm spreading over 9 ha. As per advices of the scientists of the Institute, he has developed wonderful orchards of Kinnow, pomegranate, lemon, *aonla* and *lasoda*, etc. The inter spaces between fruit trees are being utilized for raising seasonal crops/ vegetables like cluster bean, groundnut, moth bean, *kachri*, snapmelon, wheat, barley, gram, green fodders (for cattles), etc. during the different growing seasons. This has increased his farm income more than double and enough employment to his family members and others with the best utilization of farm resources. Presently, Sh. Govind Godara is earning more than Rs. 5.0 Lakhs yearly from his fruit based cropping systems / orchards as he has developed. He is very happy with the adoption of such prosperous fruit based cropping systems/models and he inspires other farmers also for the same (**Dr. Hare Krishna, Dr. S.R. Meena, Dr. M.K. Jatav and Dr. R. Bhargava**).




Fig. : Views of fruit (Pomegranate, Kinnow, lemon and *Khejri*) based cropping systems on farm of Sh. Govind Godara, 489 RDL, Sarehkunjiya village of Bikaner district, Rajasthan.

FROM THE DIRECTOR'S DESK



The ICAR- Central Institute for Arid Horticulture, Bikaner (Rajasthan) is working hard to develop location specific sustainable technologies of fruits and vegetables production in hot arid ecosystem. The climatic conditions of the hot arid regions are very hard and unsuspected changes in weather elements is common phenomenon. In such hard conditions, the horticultural development is a challenging task and it requires complete dedication, real vision and integrated approach to develop desirable technologies to reach the destiny. During last six months, the scientists of the Institute worked hard and carried out various research and extension programmes of the Institute for advancement of the horticultural development in hot arid regions of the country. They made keen efforts in identifying the promising germplasm/genotypes of arid fruits and vegetables for crop improvement. The technologies for increasing water and nutrient use efficiency in arid horticultural crop production were also carried out. The work on plant protection and standardization technologies for proper handling, maturity standards, processing, value addition and post harvest management of arid horticultural crops were also under taken. The major efforts made by the Institute during last six months in above sense are being narrated in this Newsletter in brief. I feel immense pleasure by bringing out this newsletter to highlight the research and development activities and other glimpses of the Institute during last six months.


(S. K. Sharma)
Director

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