



# ICAR-NRCSS E-NEWS LETTER



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Seed Spices E-News Letter

November -December 2021

## From Director's Desk



It is a matter of great pleasure to share this issue of Seed Spice E-Newsletter, 2021. To promote export of seed spice expert consultations on accelerating export of seed spices: challenges and opportunities was organized. Under crop improvement programme, dill elite lines were tested for state release. Green gram varieties identified for cultivation in organic production

system, IPM module for effective management of aphid was standardized for cumin and coriander to enhance quality and yield. Impact of technological interventions on yield, enhancement of fennel through FLDs in tribal district was assessed. Nutri-garden established at ICAR-NRCSS and monitoring of seed production sites were carried out. Institute conducted various HRD activities for capacity building of all seed spice stakeholders. For transfer of technologies training and input distribution programme organized under SCSP&TSP schemes. In Azdi ka Amrit Mahotsav three webinars including National Campaign "Agriculture and Environment: the Citizen Face was conducted during the period. Other programmes such as observance of vigilance awareness week, valedictory address of Hon'ble Prime Minister of India, Shri Narendra Modi in Natural farming conclave, Swachhata Pakhwada - 2021. In addition to this one research paper and two articles published during the period. Institute is continue serving the seed spice stakeholders in best of its capability by maintaining and following Covid-19 guidelines.

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## Expert Consultations on Accelerating Export of Seed Spices: Challenges and Opportunities

ICAR-NRCSS Ajmer has organized Expert Consultations on Accelerating Export of Seed Spices: Challenges and Opportunities on 22.11.2021 in hybrid mode. The Expert consultations was chaired by Padma Bhushan



Dr. R.S. Paroda, Chairman, Trust for Advancement of Agricultural Sciences (TAAS), Former Secretary, Department of Agricultural Research and Education (DARE) and Director General, ICAR. The deliberations were comprised opening session, thematic presentations, and a panel discussion by eminent national and international experts followed by concluding session. In the inaugural address, Dr. Paroda welcomed Dr. T. Mohapatra, Secretary DARE and DG, ICAR, Dr. A.K. Singh, DDG, Horticultural Science, ICAR, Dr. S.N. Saxena, Director, ICAR-NRCSS, Ajmer and other

distinguished invitees, eminent experts and participants, and outlined the importance of the expert consultations on accelerating export of seed spices. He has mentioned about seed spices importance in national economy, trade and diverse challenges of export. He further stresses upon raw product traceability, post harvest management, processing, GAPs and pesticide residue. Dr Bhagmal, Secretary, TAAS and former Director, ICAR-Indian Grassland & Fodder Research Institute, Jhansi formally welcome all the dignitaries, delegates and participants. Dr. S.N. Saxena, Director ICAR-NRCSS, Ajmer set the context of expert consultations and introduced agenda of meet. The Panel Discussion was also organized and moderated by Dr. A.K. Singh, DDG, Horticultural Science, ICAR. Eight panelists, namely, Dr. K.V. Prabhu, Dr. B.R. Chaudhary, Dr. J.S. Sandhu, Dr. N. Krishan Kumar, Dr. M.M. Anwar, Dr. S.K. Vassel, Sh. Bhagirath



Chaudhary, Dr. Homery Cherian, Dr. S. Kannan and Dr. Reema Shree made interventions and have provided useful suggestions for the way forward. Padma Bhushan Dr. R. S. Paroda, Chairman, Trust for Advancement of Agricultural Sciences (TAAS), Former Secretary, Department of Agricultural Research and Education (DARE) and Director General, ICAR delivered concluding remarks of all the deliberation and discussions. He urged all the stakeholders to increase export of seed spices in next year up to 2 billion and in next 10 years 5 billion.

## Research highlights

### Testing of Dill elite lines for state release

Dill is an annual aromatic and medicinal crop plant belonging to the Apiaceae family. It is growing in almost all the Indian states but largely grown in Rajasthan and Gujarat as a rainfed crop. A very little research work carried out on dill in country so far, resulting a scarcity of dill varieties for the farmers. Dill is valued for both its leaves and seeds due to its medicinal and nutritional potential. Nowadays, most of the varieties grown by the farmers are local and any variety which sustains in rainfed condition with high yield and quality will be very useful for the farmers and other stakeholders. In the concluded project entitled

“Breeding for high yield and quality in dill” conducted at ICAR-National Research Centre on Seed Spices, Tabiji, Ajmer, two dill genotypes AD-S-44(2419 kg/ha) and AD-S-2015-2 (2347 kg/ha)



Dill field at KVK, Anta



Elite genotypes of dill developed for high yield and essential oil content; a) AD-S-44, b) AD-S-2015-2

were Identified/documentated for giving the higher yield as compared to the check varieties AD-1 (2040 kg/ha) and AD-2 (1685 kg/ha). Further, these two genotype lines are testing at KVKs as well as farmers' fields under standardized package of practices to find their yield performance at different geographical locations in Rajasthan.

*A.K. Verma, R.S. Meena, Y.K. Sharma, N.K. Meena and S.N. Saxena*

### Green gram varieties identified for cultivation in organic production system

To identify suitability of green gram varieties for cultivation under organic production system, a varietal trail was carried out under AI-NPOF (All India National Project on Organic farming) at ICAR-National Research Centre on Seed Spices, Ajmer, Rajasthan during each *Kharif* season of the year 2016 to 2020. A total of eight varieties viz., RMG-975, RMG-62, MSG-118, RMG-492, SML-668, GANGA-1, IPM-02-3 and MUM-2 were tested under the organic production system. The results revealed that two varieties of green gram performed better in



organic management system as compared to other varieties. The maximum plant height at harvest (62.47 cm), number of primary branches per plant (5.18), number of pods per plant (27.27), number of seeds per pod (11.27) with highest seed yield (809.80 kg ha<sup>-1</sup>) exhibited by variety MUM-2 followed by RMG-975 (802.47 kg ha<sup>-1</sup>) and lowest seed yield (617.80 kg ha<sup>-1</sup>) was found in the variety MSG-118. MUM-2 variety recorded highest plant nutrient status as compared to other varieties. Among eight varieties of green gram MUM-2 and RMG-975 found better for organic farming in terms of growth, seed yield and quality aspects.

S. Lal, G. Lal, N.K. Meena, R.D. Meena, N. Chaudhary, S.N. Saxena, M.K. Chaudhary

## IPM module for effective management of aphid in cumin and coriander to enhance quality yield

The IPM module consisted with seed treatment of imidacloprid 600FS 3 ml/kg seed + foliar application of *Capparis decidua* plant extract @ 10 ml/litre at 40 days after seed germination + foliar application of *Verticillium lecani* (1x10<sup>8</sup>cfu/g) @ 6g/litre at 70 days after germination and at last foliar application of fipronil 5% SC@ 0.035% at 85 days after germination has been developed for the management of aphid on cumin. To prepare kareel plant extract, one year old fresh *Kareel* plant material was collected and chopped into small pieces. After that, took 1 kg *Kareel* pieces and added 200 ml distilled water and ground in an electric mixture to obtained plant extract by adding 1 litre of water. Then the extract was filtered through muslin cloth to obtained aqueous extract assuming 100% and preserved under 20<sup>0</sup>C temperature in well cleaned laboratory glass bottles. The stocked *Kareel* extract @10 ml/lit., was used for the management of aphid on cumin under field conditions. The other treatments were applied as recommended for field application as above. In cumin based data, it is found that this IPM module given effective management of aphids on cumin (92.55% population reduction) under field conditions and also provided highest yield (1022 kg/ha) of cumin variety GC-4, net profit Rs. 93225/- and benefit cost ratio 24.56:1. The technology validated at farmers field in two locations at Ajmer district and provided effective management of aphid on cumin with higher quality yield (213 kg/ha higher yield than farmers local practices), appreciated 25.03% over farmers practices (FP) and also increased the net profit of Rs. 31500 per hectare only due to this technology in monetary term. Similarly in Coriander based data, it is found that this IPM module given effective management of aphids on coriander (reduced 94.89% aphid population) under field conditions and also provided highest yield (2756 kg/ha) of coriander variety ACr-2, net profit Rs. 64717/- and benefit cost ratio 13.90:1. The technology was also validated at

farmer's field in one location at Ajmer district for two consecutive years. It provided the effective management of aphid and appreciated average 405 kg/ha (20.96%) quality seed over farmer's local practices as proved by the farmers. This technology also increased the net profit of Rs. 28350 per hectare only due to this technology in monetary term.

*N.K. Meena, Ravindra Singh and M.D. Meena*

## Success Story

### Impact of technological interventions on yield enhancement of fennel through FLDs in tribal district Dungarpur, Rajasthan- A case study

In order to enhance yield and productivity of fennel in tribal area, ICAR-NRCSS initiated various extension activities in the region since 2015-16 for dissemination of improved production technologies of seed spices to diversify existing cropping pattern. In the series of extension activities, there are 62 frontline demonstrations of fennel, limiting 15-16 FLDs per year were laid out on farmer's field of tribal community in Dungarpur district of Rajasthan as *Rabi* season crop during the year of 2016-17, 2017-18, 2018-19 and 2019-20. The area under each demonstration was 0.25 ha. All inputs like seeds of fennel, variety AF-1, recommended dose of fertilizers (NPK), seed treatment with *Trichoderma viride* @ 8g/kg seed, weed management by pre-emergence weedicide *oxadiargyl* @1 lit./ha and pesticides were given under TSP project of ICAR-NRCSS, Ajmer for raising successful crop. The crop was raised with the adoption of recommended package of practices developed by the institute. The follow-up programmes were organized during crop growing period and other farmers were advised to see the performance of the improved technologies in their vicinity. All the demonstrations were monitored by the scientists of NRCSS, Ajmer as well as KVK, Dungarpur, advised them to implement the provided

technologies for overall performance of crop in respect of yield and quality. Higher yield of fennel was realized under FLDs as compared to local checks in all the four years (2016-17 to 2019-20). The average seed yield of fennel in demonstrations was recorded 28.06, 18.27, 8.07 and 16.38 q/ha in the year 2016-17, 2017-18, 2018-19 and 2019-20, which was 61.54, 46.51, 33.17 and 20.09 per cent higher, respectively over local checks with farmers practices. Mean yield of all the FLDs during four years was recorded 17.70 q/ha which was 40.33 per cent higher over local checks with farmer practices. Yield and gap analysis of rabi fennel variety was also carried and it was found that the technology gap was existed in ranged between 2.74 to 4.23 q/ha with an average of 3.28 q/ha during the study period. Similarly, the average extension



Scientists of NRCSS visiting farmer's field at Bhatia, Dungarpur



Field view of FLD of fennel at Kanba, Dungarpur

gap and technology index in percent was 5.31 q/ha and 17.22%, respectively. The cumulative effect of technological intervention for increasing yield is on account of adoption of improved NRCSS variety (AF-1), line sowing technique, recommended doses of FYM and fertilizers, weeding before critical stage and plant protection measures for insect-pests and disease management. The year to year variations in cost of cultivation and yield were occurred due to the fluctuations in prevailing weather conditions of that particular region. Conducting FLDs with improved variety and scientific production technology for continue four years in Dungarpur district is resulted in realization of higher yield as well as increased awareness of farmers towards adoption of scientific cultivation practices in fennel crop. This is very helpful in diversification of existing cropping system in favour of fennel crop in tribal area of Dungarpur which ultimately improved the livelihood and socio-economic standard of tribal farmers.

*N.K. Meena, R.S. Meena, G. Lal, S. Lal, M.D. Meena, C.M. Balai\* and S.N. Saxena*

### New Initiative at ICAR-NRCSS

#### **Nutri-garden established at ICAR-NRCSS to demonstrate the importance of nutrition in food habit**

Horticultural crops based nutri-garden is the richest source of nutrition and can play an active role in eradicating under-nutrition. Nutri-garden is advanced form of kitchen garden in which fruit and vegetables are grown as a source of food and income in a more scientific way. For small and marginal farmers, nutri-garden can contribute to the family diet and provide several other benefits, particularly for women and children's. According to Indian Council of Medical Research (ICMR, 2010) recommendation for vegetable consumption can be fulfilled i.e. 300 gm of



Different views of Nutri-garden at ICAR-NRCSS, Ajmer

vegetable per person per day in which 50 g leafy vegetable; 50 g root vegetable and 200 g other vegetables. Nutri kitchen garden/Nutri garden is a method of planting and harvesting nutrient-rich crops in residential houses or in their vicinity to meet the requirements of the family all year round. Nutri kitchen gardens can be promoted in the backyard of the houses in cities and rural

areas. Therefore looking to the importance of nutri-garden in nutritional security ICAR-NRCSS, Ajmer has established one Nutri-garden in the institute premises to demonstrate & create awareness about the importance of nutrition in our food habits. In the Nutri-garden different seasonal leafy, root and seed vegetables and perennial components (fruits) were planted and demonstrated their nutritional profiling for visitors. The nutri-garden was established under the leadership of Dr. S.N. Saxena with supervision of Dr. Sanjay Kumar, Dr. S.N. Saxena, Dr. Shiv Lal, Dr. Narendra Chaudhary, Dr. C.K. Jangir, Sh. S.R. Balai and Sh. P.K. Agarwal.



Monitoring of Nigella seed production field at Kudki, Nagaur

## Quality Seed production

### Production of quality planting materials of Seed Spices through farmer's participatory mode

During 2021-22 ICAR-NRCSS, Ajmer has undertaken quality seed production of different seed spices crops at farmer's fields through participatory mode in Ajmer, Nagaur and Bikaner districts of Rajasthan. Total 14 farmers were selected based on their interest and resource availability for TFL seed production of 10



Monitoring of Fennel seed production field at Kalesra, Ajmer



Monitoring of cumin seed production field at Riyabadi, Nagaur

different varieties of six seed spices crops. The Vegetative stage monitoring of the seed production program has been taken during November and December 2021. The monitoring team observed that there are significant effects of sowing time on seed spices growth and development in seed production fields. The team has also instructed the seed growers for the timely operation of various activities viz., rouging, weeding, and thinning in cumin, coriander, and ajwain seed production.

## Transfer of technologies

### Farmers training under DBT project

One day a farmer training on Good Agricultural Practices in fenugreek cultivation was organized at Krishi Vigyan Kendra Abusar, Jhunjhunu on 09/11/21. Farmers were imparted with advance production technologies, post harvest management and good marketing practices for higher returns in fenugreek cultivation by the experts from ICAR-NRCSS and KVK Abusar, Jhunjhunu. Ten farmers were also provided with better quality seeds of fenugreek and fertilizers and plan protection chemicals for FLDs. The training was successfully coordinated by Dr. Shyam Sunder Meena, Dr. S.S. Meena and Dr. Murlidhar Meena.



Training of fenugreek farmers at KVK, Abusar

### Input distribution for FLD's on Cumin and Nagauri pan methi

Ten FLD of each, cumin and Nagauri pan methi were distributed to farmers at Katyasani and Mundawa villages in Nagaur district of Rajasthan on 25- 26 October, 2021. Inputs for FLDs includis seed, fertilizers and plant protection chemicals were provided to the farmers in above villages. Farmers were also trained on good agricultural practices (GAP) of raising cumin and pan methi. This programme conducted by Dr. S.S. Meena, Dr. Shiv Lal and Dr. Murlidhar Meena.



Cumin FLD beneficiaries at Katyasani



Input distribution for fenugreek FLD's



Nagauri Paan Methi beneficiaries at Mundawa

## SCSP programme of ICAR- NRCSS

### Clean and safe production of cumin

One day programme was organized to popularize quality seeds of cumin (GC-4) among the SC farmers by FLDs on 17/11/2021 at village Jatto ka bera of Barmer district. In addition to this, training kit (bag, notepad and pen), bioagents (*Trichoderma harzanium*, *T. viridae*), *N P K consortia*, vermibeds, solar torch and bio decomposer were also distributed to each SC beneficiaries. To impart technical know how about vermicompost preparation, use of N P K consortia, bio-decomposer, seed treatments, cumin production practices, theme based lectures were also delivered to participants by scientist of ICAR-NRCSS, Ajmer. All farmers were also briefed about package of practices of clean and safe cumin production. As far as



possible safety measures (mask) and appropriate social distancing was followed during the entire programme. A total of 30 SC farmers were participated in this event and got benefitted. This programme was coordinated and organized by Dr. Shiv Lal, Dr. N. Chaudhary, Dr. Sanjay Kumar, Scientist, Dr. C.K. Jangid.

### Training cum agri-input/items distribution programme and monitoring of FLDs

To promote and popularize organic cultivation of seed spices, one day training cum agri-input distribution programme was organized at Dujodh, Sikar on 24/12/2021. In this programme lectures on organic cultivation of fenugreek was delivered by speakers and ICAR-NRCSS standardized organic modules, packages and products was discussed. In addition to this in this training programme training kit (bag, notepad and pen), waste decomposer, NPK consortia, ber plants, Khejri plants and milk cans was also distributed to each Schedul cast (SC) beneficiaries. As far as possible safety measures (mask) and appropriate social distancing was followed during the entire programme. A total of 50 SC farmers (females) were participated in this event and got benefitted. This programme was coordinated and



organized by Dr. Shiv Lal, Dr. R.D. Meena, Dr. C.K. Jangir. In this event Shri Bhagirath Mal ji Sabal, Assistant Director (Agriculture), Sikar, Shri Ram Ratan Swami, AO, Sikar was also delivered their lectures. After the training programme 5 fenugreek FLDs (AFg-4, AFG-5 and AFG-2) at Singrawat village (Losal) was monitored and needful technical measures (weeding, disease management, irrigation etc.) were suggested.

## TSP programme of ICAR- NRCSS

A programme under TSP was conducted by Dr. R.D. Meena and Dr. Chetan kumar Jangir. At Panarva (Phalasia), Udaipur 145 farmers belonged to scheduled tribe (ST) community was benefited in this training programme on 24 November, 2021. During the programme useful lectures were provided from outsourcing also. Various issues raised and healthy discussion was made among farmers, state government staff & ICAR-NRCSS scientists. The farmers were also briefed on the subject regarding package of practices of seed spices cultivation and use of vermin pit. The participants were distributed vermin-bed, knapsack sprayer and registration kit etc.



## HRD activities

### Azadi Ka Amrit Mahostav

Under the main theme “Azadi ka Amrit Mahotsav’ 3 webinars/seminars have been organised during the October-November by the different eminent speakers. The first programme was organised on Agriculture and Environment: the Citizen Face & Constitution Day in the NRCSS auditorium on 27.11.2021. An in-house webinar was organised on the topic Viral diseases and their management and the lecture was delivered by Dr R.D. Meena on 03.12.2021. Another webinar was organised on Impact of COVID 19 on Indian Agriculture and the speaker was Dr. M.D. Meena on 17.12.2021. The convenors of webinars were Dr. A.K. Verma, Dr. Sharda Choudhary and Dr. M.D. Meena.



### National Campaign “Agriculture and Environment: the Citizen Face

Azadi Ka Amrit Mahotsav is an initiative of the Government of India to celebrate and commemorate 75 years of progressive India and the glorious history of its people, culture and achievements. Under the main theme “Azadi ka Amrit Mahotsav’ one programme has been organised by ICAR-National Research Centre on Seed Spices, Ajmer, Rajasthan.



On the theme National Campaign “Agriculture and Environment: the Citizen Face”. Under the programme NRCSS has invited 11<sup>th</sup> and 12<sup>th</sup> standards students of Sharadhana School, Ajmer. Total 90 people were participated in the programme including 50 students. In the programme, scientists from the ICAR-NRCSS, Ajmer highlighted the importance of agriculture and environment in the country as well as in the world. It was also taught to the student how they can start their career in agriculture sectors. Besides this, exposure visit has been organised to the experimental fields and NRCSS agriculture museum. A quiz competition also organised for the students and prize distributed among the winners.

### Farmers Training under ATMA

A farmer training of five days on Improved Agricultural Practices for Seed Spices Cultivation was organized at ICAR-National Research



Centre on Seed Spices, Tabiji, Ajmer under financial support of Project Director, ATMA, Jaipur (Rajasthan) during 27-31 December, 2021. The training was coordinated by Dr. R.D. Meena, Scientist (Plant Pathology), Sh. Ravi Y., Scientist (SPMA), Dr. N.K. Meena, Sr. Scientist (Entomology), ICAR-NRCSS in which 24 lectures on different aspect of seed spices were delivered and 30 farmers from Jaipur district were participated and benefitted.

## Constitution Day

Constitution day was celebrated by ICAR-NRCSS, Ajmer on 27.11.2021. Under the programme NRCSS has invited 11th and 12th standards students of Sharadhana School, Ajmer. Total 90 people were participated in the programme including 50 students. In the programme, Dr. Y.K. Sharma, Dr. O.P. Aishwath, Dr Krishna Kant, Dr N.K. Meena and Dr. A.K. Verma expressed their views on constitution day. All the participants were taken to take the constitution pledge. The coordinators of the programme were Dr. N.K. Meena and Dr. A.K. Verma.



## Events/Days/Programmes etc.

### Observance of Vigilance Awareness Week – 2021

ICAR-NRC on Seed Spices, Ajmer observed Vigilance Awareness Week from 26<sup>th</sup> October, 2021 to 1<sup>st</sup> November, 2021 at ICAR-NRCSS campus. This year the main focus of Vigilance Awareness Week is "Independent India @75: Self Reliance with Integrity". The observance of Vigilance Awareness Week at ICAR-NRCSS, Ajmer was commenced with integrity pledge on 26.10.2021 at 11:00 A.M. administered by Dr Y.K. Sharma, Vigilance Officer, ICAR-NRCSS to the officials and staffs of ICAR-NRC on Seed Spices, Ajmer followed by general discussion on Vigilance and observance of Vigilance awareness week. The banners of vigilance

awareness week, slogans and pamphlets for the awareness of vigilance were displayed at different places in the campus and outside the campus to sensitize the persons for vigilance awareness. To spread awareness and campaign about complaints under PIDPI (Public Interest Disclosure and Protection of Informers), two posters prepared by CVC were also displayed at the office.

On 29.11.2021, ICAR-NRCSS organized a Workshop on Theme: 'Independent India @75: Self Reliance with Integrity' in which officials and staff of ICAR-NRCSS, participated. At the outset, Dr. Y.K. Sharma, Vigilance Officer briefed about the theme and its importance in vigilance point of view and different activities being conducted during the Vigilance Awareness Week. The officials of the centre Shri Sanjeev Sharma, Dr. Krishna Kant and Dr. Shiv Lal expressed their

views about the theme and need of the vigilance. Dr. S.N. Saxena, Director, ICAR-NRCSS & Chief Guest on the occasion delivered the speech and expressed his views about Vigilance Awareness Week and on the theme 'Independent India @75: Self Reliance with Integrity'. He also appealed to work hard for the development of the organization and for the development of the country. At last Dr. Y.K. Sharma, Vigilance Officer proposed vote of thanks to the Director and all the staff members. All necessary arrangements were made keeping in view of COVID-19 guidelines as well as economy measures mentioned as per the circular of CVC, for organizing seminar / workshop, etc. for observing the Vigilance Awareness Week during 26<sup>th</sup> Oct, 2021 to 1<sup>st</sup> Nov, 2021.

### **ICAR-NRCSS participated in the valedictory address of Hon'ble Prime Minister of India, Shri Narendra Modi in Natural farming conclave**

ICAR-NRCSS Ajmer participated in the National Conclave on Natural Farming held at AAU, Anand, Gujarat on Natural Farming on 16/12/21 in virtual mode. All the staff members of the centre witnessed the deliberation made by different dignitaries in this conclave. Gujarat Governor, Achary Devdrat Ji shared his

experience of natural farming at Gurukul Kurukshetra, Hariyana. Hon'ble PM Sh. Narendra Modi addresses the participants about ill effects of increasing use of chemicals in agriculture and narrated the need, scope and importance of natural farming. This programme gave new ideas for research on natural farming, which will be helpful to participants in years to come. The programme was coordinated by Dr. Murlidhar Meena, Scientist & In-Charge ARIS Cell.

### **Swachhata Pakhwada-2021**

ICAR-NRCSS observed Swachhata Pakhwada-2021 (16-31 December, 2021). During this Pakhwada several Swachhata related activities were carried out at institute like display of banner, taking Swachhta pledge, cleanliness drives, KISAN DIWAS and awareness programme. Webinar on "Curb the use of single use plastic (SUP) and discourage the use in office/homes" and "promotion of waste to wealth mission" were also organized during this pakhwada in order to wide publicity of this campaign. All officials of ICAR-NRCSS were actively participated in this programme. The programme was coordinated by Dr. Narendra Chaudhary (Nodal Officer, SBM), Mr. Ravi Y. (Member) and Dr. C.K. Jangid (Member).



ICAR-NRCSS staff witnessing the speech of Hon'ble PM Sh. Narendra Modi speech



## Training/workshop/seminar etc.) Organized

S. No	Name of Programme (Training/workshop/seminar etc.) Organized	Date of Programme	Participant (No.)
1.	Expert Consultation was organized for "Accelerating Export of Seed Spices: Challenges and Opportunities" on 22 November, 2021 in a hybrid mode	22 November, 2021	A total of 60 participants attended the program.

## Training/Workshop/Seminar/Virtual Meet/Webinar etc.) attended

S. No.	Name of Programme (Training/workshop/seminar etc.) attended	Organized By (Name of Institute)	Date of Programme	Participant (Name)
1.	Chaired the Technical Session-XII (online) "Innovative ICT Applications and Effective Decision Support Systems to Combat Climate Change, Disasters and Droughts during 30th National Conference "Soil and Water Management Technologies for Climate Resilience, Agricultural and Environmental Sustainability"	Bhubaneswarr, Odisha, India	14-16 December, 2021	Dr O.P. Aishwath
2.	Attended XVI AGM of AINP-OF and presented annual research findings of ICAR -NRCSS AI-NPOF experiments	ICAR-IIFR, Modipuram, UP	3-4 December, 2021	Dr. Shiv Lal, Dr. N. Chaudhary

## Publications

Meena M.D., Meena, S.S., Lal, S., Lal, G., Choudary, B. and Sandip Agale. 2021. Economic analysis of Pan Methi cultivation in Nagaur district of Rajasthan. *International J of Seed Spices*, 11(1):23-30.

शिव लाल, नरोत्तम मीना, आर डी मीना, नरेन्द्र चौधरी, महेंद्र चौधरी, नेहा शेखावत एवं श्रीराम बलाई. प्राकृतिक खेती: परिचय एवं बीजीय मसाला फसलोंत्पादन में सम्भावनायें. 2021. मसाला सुरभि, जून प्रकाशन, प्रकाशन निदेशक, राष्ट्रीय बीजीय मसाला अनुसंधान केंद्र, प्र.स. १३-१५

शिव लाल, नरोत्तम मीना, शैलेन्द्र नाथ सक्सेना, आर डी मीना, नरेन्द्र चौधरी, महेंद्र चौधरी, नेहा शेखावत. 2021. गरम मसाला: महत्व एवं प्रसंस्करण. मसाला सुरभि, जून प्रकाशन, प्रकाशन निदेशक, राष्ट्रीय बीजीय मसाला अनुसंधान केंद्र, प्र.स. 37-39

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