SEED SPICES
E - Newsletter
ICAR-National Research Centre on Seed Spices

An ISO 9001:2008 Certified Institute

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Important Events

Workshop cum brainstorming session (27th May, 2015)

A workshop cum brainstorming session on "Strategies to Strengthen Seed Spices Plant Genetic Resources and Burning Issues of Cumin and Coriander" was organized by the centre in collaboration with Indian Society of Seed Spices (ICAR-NRCSS) on 27th May, 2015 with an objective to address the viable strategic approaches for streamlining handling and utilization of seed spices plant genetic resources and to discuss upon the strategies for mitigating the dreadful diseases like cumin *Alternaria* blight and coriander stem gall, the major burning issues of the recent past. The workshop cum brainstorming session was presided by the Chief Guest, Padma Bhushan laureate Dr. R. S. Paroda, Chairman, *TAAS, IARI,* New Delhi. Other dignitaries on the dias were, Guests of Honour Dr. R. R. Hanchinal, Chairperson, *PPV&FRA,* New Delhi, Dr. S. B. Dandin, Former Vice Chancellor, Liaison Officer, Bioversity International, Bangalore and Dr. R. K. Bhatt, Director, *ICAR-CAZRI,* Jodhpur and Organizing Chairman Dr. Balraj Singh, Director, ICAR-NRCSS, Ajmer. The workshop also witnessed participation of expert personnel's of concerned specialization from various institutes, scientific faculty of the centre and more importantly farmers of the surrounding region.



Padama Bhushan Dr. R.S Paroda, Lighting lamp during inaugural function of workshop cum brain storming session

Important Events

The workshop began with a formal welcome to the dignitaries and participants along with inaugural address by Dr. Balraj Singh, Director, NRCSS followed by keynote address by Guests of Honour and Chief Guest of the workshop cum brainstorming session. During their discourse, the Chief Guest and Guests of Honour briefed on the importance of plant genetic resources of seed spices and their role in formidable growth of the spices sector in the country. Expert personnel's invited from various institutes along with in house scientists of plant genetics, plant protection and plant production division made sound presentations and deliberations upon the key issues of the workshop cum brainstorming session. Through comprehensive and exhaustive discussions among the accomplished participants, recommendations to strengthen seed spices plant genetic resources and mitigation of dreadful diseases of cumin and coriander were evolved. At the end Director, NRCSS concluded the workshop cum brainstorming session with a formal vote of thanks to all the dignitaries and participants for actively involving in discussions and deliberations and for making the event a grand success.



Padama Bhushan **Dr. R.S. Paroda addressing during inaugural function of Workshop cum Brainstorming session**



Brain storming session on cumin Alternaria blight & coriander stem gall

Sanitation and cleanliness programme under swachh bharat abhiyan

Three well scheduled cleanliness programmes were conducted on May 8, May 20 and June 10, 2015 were conducted under National Campaign "Clean India Mission" within & outside the NRCSS campus. This programme was performed under the leadership of Dr. Balraj Singh, Director & active participation of all the staff members of the centre was observed.





Glimpse of clean NRCSS Mission

Important Event

जलवायु परिवर्तन के सन्दर्भ में पर्यावरण सुरक्षा की चुनौतियॉ एवं कृषि पर प्रभाव

दिनांक 5 जून, 2015 को विश्व पर्यावरण दिवस के अवसर पर डा़ गोपाल लाल, प्रधान वैज्ञानिक एवं कार्यवाहक निदेशक की अध्यक्षता में एक वैज्ञानिक परिचर्चा का आयोजन किया गया। संस्थान के सभी वैज्ञानिकों, अधिकारियों एवं कर्मचारियों ने जलवायु परिवर्तन के संदर्भ में पर्यावरण संरक्षण की चुनौतियों एवं कृषि पर प्रभाव विषय पर अपने अनुभवों तथा सामूहिक प्रयासों पर चर्चा में भाग लिया। जलवायु परिवर्तन एक लंबे समय से चल रहे अवैज्ञानिक प्राकृतिक दोहन का नतीजा है जिसका त्वरित समाधान संभव नहीं है। इसका समाधान केवल प्राकृतिक एवं वैज्ञानिक तरीकों के उपयोग द्वारा पर्यावरण संरक्षण से ही किया जा सकता है। इस अवसर पर विभिन्न वक्ताओं ने परिचर्चा में भाग लिया एवं पर्यावरण संरक्षण हेतु विभिन्न तथ्यों पर जानकारी दी। पर्यावरण परिवर्तन से कृषि पर होने वाले कुप्रभावों पर मनन किया गया एवं कृषि को पर्यावरण परिवर्तन के दुष्प्रभावों से बचाने हेतु विभिन्न उपायों पर चर्चा की गयी। एकमत से पर्यावरण सरंक्षण, पारिस्थितिकी तंत्र को संरक्षित करने हेतु विचार प्रकट किये गये। संगोष्ठी में जल, मृदा, वन, वायु, भोजन एवं उर्जा के तर्क संगत उपयोग पर बल दिया गया। हम पर्यावरण संरक्षण को मनोयोग से करने का प्रयास करें तो भविष्य में आने वाली कई प्राकृतिक आपदाओं को कम कर सकतें हैं। इस उपलक्ष्य में कृषि विज्ञान में हिन्दी के प्रयोग को बढ़ाने के लिए एक दिवसीय राजभाषा संगोष्ठी का भी आयोजन किया। कार्यक्रम संचालन डॉ. बृजेश कुमार मिश्र, वरिष्ठ वैज्ञानिक एवं राजभाषा प्रभारी ने किया। विश्व पर्यावरण दिवस के अवसर सभी उपस्थित अधिकारियों एवं कर्मचारियों ने व्यक्तिगत स्तर पर पर्यावरण संरक्षण का संकल्प लिया। इस वैज्ञानिक परिचर्चा के माध्यम से देश में विभिन्न क्षेत्रों में पर्यावरण संरक्षण में आने वाली विभिन्न चुनौतियों पर विचार विमर्श किया गया। धन्यवाद ज्ञापन डॉ. एस. एस.राठौर ने किया तथा कार्यक्रम की सफलता के लिए सभी लोगो का आभार व्यक्त किया।





Research Highlights

The status of microbial biomass carbon in organic field of NRCSS, Ajmer

R.S. Mehta, B.K. Mishra, Seema Rani and Hemant Kumar Ameta

Microbial biomass is a measure of the weight of the microorganisms in soil, which mostly consists of bacteria, fungi and other microbes called Archaea. Measure of microbial biomass usually measure either the weight of carbon or nitrogen in soil microorganisms.

Microbial biomass carbon is a useful indicator of soil quality. Soil microorganisms are involved in several processes that influence soil quality and microbial biomass changes rapidly in response to changes in soil properties. Increase in microbial biomass over time are considered beneficial. They may indicate an increase in beneficial biological functions in soil or a future increase in organic carbon content in soil. In contrast, a decline over time is considered to have a negative effect on soil quality.

There are three types of microbial biomass found in soil i.e. potential microbial biomass, attainable microbial biomass and actual microbial biomass**.** The potential microbial biomass of a soil is the maximum microbial biomass that could be sustained by the soil if no other factors were limiting microbial biomass. The attainable microbial biomass is the maximum level that can be expected in a soil under a particular land use. It is mostly determined by the climate, because climate influences soil water content and inputs of organic carbon to soil. The actual microbial biomass is determined by management practices.

Microbial biomass carbon is rarely more than 5 % of the total organic carbon in soil. Therefore 5 % of the organic carbon content of the soil represents an estimate of the attainable microbial biomass carbon for that soil. The actual microbial biomass is generally lower than the attainable microbial biomass.

A laboratory protocol has been standardized for estimation of microbial carbon of organic seed spices production. The experiment of microbial biomass carbon estimation was carried out with chloroform fumigation aided extraction method in which chloroform is used as effective biocide and does not solubilize non-microbial soil organic matter, subsequently, microbial C is extracted by 0.5 M K_2SO_4 solution from fumigant solution and further concentration was measured on spectrophotometer at 280 nm wavelength

The microbial biomass carbon is an indicator of soil microbial population. This also provides a glimpse of biological health of soil. In an experimental farm of organic cultivation of seed spices at NRCSS, it was observed that microbial biomass carbon was higher in crops i.e. ajwain, fenugreek and nigella than the same seed spices grown under conventional system with application of recommended dose of fertilizers (control).

Table 1: Present status of microbial biomass C of organically cultivated seed spices crops at NRCSS , Ajmer under Network Project on organic farming horticulture

Sr. No.	Crop	Range of Microbial Biomass C in Organic Soil (µg of C/g soil)		Range of Microbial Biomass C in control RFD soil (µg of C/g soil)	
		Minimum	Maximum	Minimum	Maximum
1.	Ajwain	6.25	30.37	0.10	2.36
2.	Fenugreek	4.17	32.10	1.54	30.10
3.	Nigella	2.81	55.67	10.70	29.74

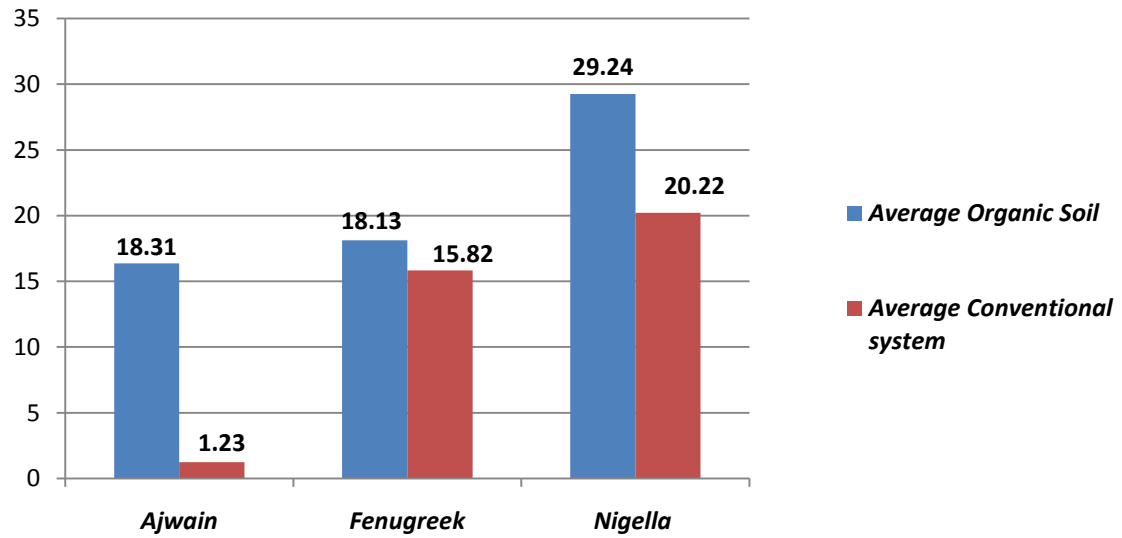
Research Highlights

In ajwain, average microbial carbon of 18.31µg/g soil was recorded under organic cultivation compared to 1.23 µg/g soil microbial carbon under conventional cultivation.Thus,15 times higher microbial carbon was recorded under organic cultivation than the conventional system with recommended dose of fertilizers along with traditional cultivation practices.

Similarly, in fenugreek, an average microbial carbon 18.13 µg/g soil was obtained under organic cultivation than 15.82µg/g soil microbial carbon found with conventional cultivation practices which is 14.6 % higher comparatively.

In organic cultivation of nigella an average 29.24 µg/g soil microbial carbon was observed which is 40.59% higher over conventional system (as shown in chart 1).

Chart 1: An average of minimum and maximum range of microbial biomass C under organic and conventional system, respectively.



The experiment is being carrying out further for other seed spices crops under organic cultivation as well as under conventional system. Assay of higher microbial carbon under organic cultivation of seed spices is an important piece of information for future sustainability of organic seed spices production in arid zone of Rajasthan.



Chloroform Fumigation Extraction Experiment



Application of Chloroform



Observation on Spectrophotometer

Research Highlights

Isolation of soluble fibre galactomannan from fenugreek seed

S.S. Rathore, S.N. Saxena, D. Agarwal, S. Verma, T. John Zachariah M. Anandaraj and Balraj Singh

Fenugreek endosperm contains a polysaccharide based hydrocolloid galactomannans, a high molecular weight polymers. Industrial applications of galactomannans arise due to their interactions with molecules of their own kind as well as with other molecules. Indian sub continent is a major producer of cluster bean, which is the source of galactomannan. Galactomannan from fenugreek seed may serve as substitute of guar gum in non food applications. Fenugreek seed contains (dry basis) approximately 25-30% insoluble fiber and 20-25% soluble fiber i.e. galactomannans. Between the two endosperms is sandwiched yellowish gum portion. Galactomannans generally consists of a β, 1-4-linked linear mannan backbone, to which single galactose grafts are linked randomly by α, 1-6 glycoside bond. Medicinal properties of seed are due to soluble dietary fiber. Being non-metabolized in human system, the galactomannans act as dietary fibers and promote the beneficial pre-biotic colon bacteria. FG, compared to other dietary fibers, shows maximum efficacy in lowering blood glucose and lipids including LDL and cholesterol. In India, many persons regularly take whole fenugreek seed powder, in spite of its bitter taste and odour. Under network consortium project "High value compounds" at NRCSS, a simple and efficient procedure has been standardized for isolation of galactomannan from fenugreek seeds. The isolated galactomannan can be of high value.



Precipitated form of β-galactomanna



Pure form of β-galactomanna

Transfer of Technology

Participation in rashtriya sehkar masala mela-2015

Two Rashtriya Sehkar Masala Melas (five days) were organized by Cooperative Society from 20-24 May, 2015 in Jaipur and from 18-22 June, 2015 in Ajmer, respectively. ICAR-NRCSS, Ajmer participated in both the events for promotion of value added products. Mr. M.A. Khan, Assistant Chief Technical Officer, Sh. Yash Sharma, RA and Mr. Lokesh Sharma, SRF exhibited the value added products & technologies developed by NRCSS, for the benefit of the end users. A good number of visitors came over NRCSS stall & many of the queries made by visitors were clarified by the staff present.



Stall of NRCSS at Sehkar Masal Mela, Jaipur



Stall of NRCSS at Sehkar Masal Mela, Ajmer

Participation in kisan mela at KVK, Muzaffarnagar, U.P.

ICAR-NRCSS took active participation in a *Kisan Mela* organized by Krishi Vigyan Kendra, Muzaffar-nagar, U.P. on 27th June, 2015. Dr. Balraj Singh, Director being the special invitee attended the programme and Mr. S.R. Meena, STO and Sh. Sachindra Kumar, SRF had also participated & exhibited the products & technologies developed by the centre. The Kisan Mela was inaugurated by Hon'ble Dr. Sanjive Kumar Balyan, Union Minister of State (Agriculture), GOI, N. Delhi.



Hon'ble Dr. Sanjive Kumar Balyan, Union Minister of State Agriculture, GOI, Dr. NK Krishna Kumar DDG (HS) and Dr. T. Jankiram ADG (HS) ICAR , N. Delhi visited the stall of NRCSS

Human Resource Development

Training on "production protocol for bio-control agents" at National institute of plant health management

Sh. Siya Ram Meena, Sr. Tech. Officer (T-6) attended 11 days training on "Production protocol for bio control agents at National institute of plant health management, Rajendranagar, Hyderabad during 5-15 June, 2015. During training period following techniques were learnt:

Agro ecosystem analysis (AESA) in vegetable crops & grain crops, ecological engineering model for pest management, low cost mass Production technology for antagonistic fungi & bacteria, Preparation of botanical pesticides, production & application techniques of entomopathogens, bio priming & seed treatment with antagonistic fungi & bacteria, EPN mass production technology, Pheromone, lure & traps for pest management Bio-agents (predators, parasitoids & parasites) production & application, corcyra mass rearing, trichogramma rearing & tricho cards preparation, mycorrhiza & vermicompost production & uses Entomo Pathogen Nematode (EPN) mass production, Bracon & Reduviid bug mass rearing, field release practice of bio-agents, farmers field visit for AESA chart preparation, hand on practice for mass production of BCA, pseudomonas & trichoderma and disease & pest diagnostic techniques & application.

Main aim of the training was to make aware the farming community to adopt low cost eco-friendly plant protection sources on farm production of bio agents, to minimize pesticide residues in farm harvest without hazarding nature.









Human Resource Development

Participation in "Awareness cum training program for cultivation and development of coriander seeds"

On the invitation from Spice Board of India and deputation by the Director, NRCSS, Ajmer, Dr. P.N. Dubey, Sr. Scientist (Ag. Chemistry) participated in the **"**Awareness cum training program for cultivation and development of coriander seeds" at Akluj, Sholapur, Maharashtra on 30th June, 2015. The program was presided by Shri Ranjitsingh Mohite Patil, Hon. Member of Parliament. Other dignitaries present in the programme were Dr. Nanjundeshwaran, Deputy Director, Spice Board of India, Mumbai, Shri Anand Choradia, CEO, Praveen Masala, Pune and other dignitaries. As a key speaker of the occasion Dr. P.N. Dubey made presentation on the topic "Coriander- Improved cultivation practices" in the local language Marathi covering various aspects of coriander cultivation, package and practices, suitable varieties, fertilizer use, pest and diseases, harvest, post harvest technologies, value addition *etc*. More than 300 farmers from the region attended the programme. Solutions for the various queries raised by the audience and issues related to the coriander cultivation, suitability of soils, climate, processing, and marketing were amicably provided so as to promote the coriander cultivation as an alternative crop in the region.





Human Resource Development

Annual review meeting of the schemes under MIDH development programmes on spices & aromatic plants attended

Dr. Gopal Lal, Principal Scientists & PI(TOT) and Dr Y. K. Sharma, Principal Scientist and PI attended Annual Review Meeting of the Schemes under MIDH Development Programmes on Spices & Aromatic Plants implemented through DASD, Calicut held at Horticultural College and Research Institute, Venkataramannagudem, Tadepalligudem on (19th & 20th June, 2015). The inaugural function of the meeting was presided over by Dr B M C Reddy, Vice Chancellor, Dr. Y. S. R. H. U. Dr. S. K. Malhotra, Commissioner (Horticulture) was the Chief Guest of the Inaugural Function, Dr. Homey Director, DASD, Dr. Nirmal Babu, PC, AICRPS were other guests of the function. There were deliberations for reviewing the work implemented on spices and aromatic plants and discussion for formulation of technical programme for the next year. Dr Y. K. Sharma presented the progress report of the scheme implemented at ICAR-NRCSS, Ajmer during 2014-15 and discussed the programme for the year 2015-16. Dr. Gopal Lal participated in the deliberations & discussed and answered the queries on different issues of seed spices in the meeting.



Human Resource Development

Hello Kisan programme on DD Kisan Channel

Dr. Balraj Singh, Director, NRC on Seed Spices, Ajmer and Dr. R. S. Mehta, Principal Scientist (Agronomy) had participated as experts in Hello Kisan Programme on *"Bijya Masala Phasalo Ka Utpadan Ayvom Jal Sanskaran"* broadcasted live on DD Kisan Channel from New Delhi on 24.06.2015 from 6.00 -7.00 PM. In the programme various issues on seed spices production & water conservation were discussed and live questions of the farmers from all over the country were addressed with proper solutions for the benefit of the farmers who were witnessing this programme.

Training attended

❖Siya Ram Meena, Sr. Tech. Officer (T-6) attended 11 days training programme on "Production protocol for bio control agents" at National institute of plant health management, Rajendranagar, Hyderabad during 5-15 June, 2015.

Symposia/seminars/conferences/meetings attended

❖Dr. Balraj Singh, Director participated in the meeting for Vice-Chancellors of AUs and Directors of ICAR Institutes at New Delhi on dated 15-16 May, 2015.

❖Dr. Balraj Singh, Director and Dr. S.S. Rathore, Senior Scientist (Biochemistry) attended first shadow committee meeting on Spices & Culinary Herbs (CCSCH 2) at Udyog Bhawan, New Delhi on dated 8-6-2015.

❖Dr. Balraj Singh, Director attended Farmer's Fair & National Symposium on Climate Change and Smart Agriculture Technologies at RVSKVV, Gwalior, MP on dated 13-6-2015.

❖Dr. Balraj Singh, Director attended Fair at KVK Baghra, Muzaffarnagar, UP on dated 27-6-2015

❖Dr. S.S. Rathore, Senior Scientist (Biochemistry) attended Fourteenth Meeting of the Spices, Culinary Herbs and Condiments Sectional Committee, FAD 9 held on Tuesday, May 12, 2015 at Spices Board, Kochi.

❖Dr. P.N. Dubey, Sr. Scientist (Ag. Chemistry) participated in the "Awareness cum training program for cultivation and development of coriander seeds" at Akluj, Sholapur, Maharashtra on 30th June, 2015.

❖Dr. O.P. Aishwath, Sr. Scientists (Soil Science) attended 'Standing Committee on Policy and Bye-Laws' of Indian Society of Soil Science on 11.06.2015 and 'Executive Council's meeting of Indian Society of Soil Science on 12.06.2015.at Division of Soil Science and Agricultural Chemistry, IARI, New Delhi.

❖Dr. S.S. Rathore, Senior Scientist (Biochemistry) attended National Seminar on "Climate change and smart agriculture technologies" held on June 13-14, 2015 at RVSKVV, Gwalior and delivered invited lecture on "Atmospheric pollutants: Alters the plant secondary metabolites of seed spices".

❖Dr. Gopal Lal, Pr. Scientists (Hort.) and Dr. Y.K. Sharma Pr. Scientist (Patho), attended Annual Review Meeting of the schemes under MIDH at HCRI, Venkataramannagudem, (A.P.) during 19-20 June, 2015.

From the Director's Desk



Seed Spices are the high valued low volume crops of Mediterranean origin. Despite of their foreign origin, they share world's largest area in Indian Sub-continent, specifically, in the arid and semi arid areas. Though this group of spice is comprised of numerous crops, more than 80% of its share is from cumin and coriander. Environmental factors being very crucial for year round production in agriculture; present circumstances of climate change are challenging the ability of harvesting the potential yields. To sustain against nature's adversities, plants adapts themselves, creates diversity and evolves following the rule of 'survival of the fittest'. Over the years these high valued seed spices have nourished its dependents and have made the country to be recognized as the supreme producer and exporter of good quality cumin, coriander, fennel, fenugreek, ajwain etc at global level. Thus, to win against nature's adversity, natural means are the best; plant genetic resources are the one which have the power of sustaining the dynamism of agriculture on earth over and above the environmental challenges. Owing to such a great potential of plant genetic resources, in the scenario of rapid changing climatic conditions and emergence of new races of biotic factors & its severity of infestation, strategies for further strengthening the PGR's of seed spices and development of resilient varieties of broad genetic base with resistance to biotic and abiotic factors are inevitable. In this contrast, a workshop cum brainstorming session was organized at the centre on 27th May, 2015 to discuss upon the strategies to strengthen, conserve and streamline the handling of plant genetic resources for breeding superior varieties/hybrids and to develop eco friendly strategies to mitigate the ill effects of cumin alternaria blight and coriander stem gall. On the occasion of world's environment day, with the theme behind, severe depletion of natural resources and changing climatic conditions, an important event in the form of debate was organized to discuss upon the key issues of environment protection and conservation.

Contributing to the sustainability of organic seed spice production in arid parts of Rajasthan, a study revealing presence of higher microbial biomass carbon in organic seed spices fields as compared to non organic fields has been done by the faculty of microbiology and plant production division of the centre. A simple and efficient method for isolation of soluble fibre galactomannan from the endosperm of Fenugreek seed has also been standardized by the faculty of basic science division of the centre.

During the period centre actively took part in exhibitions and kisan mela and familiarized the novel products of seed spices and transferred the vibrant technologies developed by the centre among the farmers and end users. With the motto of serving seed spices growers of the country and sharing the knowledge of improved seed spices production and water conservation practices, scientists from the centre had participated in Hello Kisan programme of DD kisan channel, New Delhi as expert personnels and responded to live phone in queries of the farmers and brought in further visibility of the centre at national level. As a responsible deed under "Swachh Bharat Abhiyan", with a mission mode approach of transforming the centre into "Green NRCSS and Clean NRCSS" three cleanliness programmes were taken up in and around the premises of the centre during the period.

Balraj Singh

