हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद
Agrisearch with a human touch

National Research Centre on Seed Spices
Tabiji, Ajmer-305206, Rajasthan

भाकृअप
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Directors' Message



Dear all

The aroma of Zeera, *Dhania,Saunf, Ajowain and Dill* is present in the air. The month of May & June are in the peak of summer at Ajmer. The produce is being threshed cleaned and graded. All these activities are mechanized at the centre in order to ensure clean & safe production of spices.

Dr. S.S. Rathore, Sr. Scientists has attended a meeting at Anand for the preparation of interesting project on Phyto-chemicals and high value compounds for Platform Research. Dr. Sharda Choudhary attended world congress on Biotechnology-2012 from 4th may - 6th may 2012 at International Centre for Exhibitions and Conventions, Hyderabad, India.

Global Conference on Horticulture attended by NRCSS scientists for food, nutrition and livelihood options held on May 28-31, 2012 at Bhubaneswar and Orissa. Dr. Ravindra Singh, Sr. Scientist attended and delivered lecture on on "Indian Spices best for Export" and also attended a meeting on Task Force Committee on Seed Spices. One of our Sr. Scientists Dr. S.N. Saxena has attended IFT Annual Meeting & Food Expo 2012 organized by the Institute of Food Technologists at Las Vegas, USA. I also visited Texas A & M University, USA for a short duration study visit.

In the end Dr. K. Krishna Kant has given research information about Cigarette beetle, *Lasioderma serricorne* Fab - A serious pest of stored seed spices and Dr. S.N. Saxena has given research information regarding Cryogenic Grinding: A novel approach for retention of flavour and medicinal properties of seed spices

With best regards

Gopal Lal

Attended Meeting at Anand

Dr. Surendra Singh Rathore, Sr. Scientist (Biochemistry) attended meeting held at DMAPR, Anand on May 3-4, 2012 regarding preparation of the project on Phyto-chemicals and high value compounds for Platform Research during XII plan period. The meeting was chaired by Director, DMAPR. All the consortia partners were present there.

World Congress Attended

Dr. Sharda Choudhary attended world congress on Biotechnology-2012 from 4th may -6th may 2012 at International Centre for Exhibitions and Conventions, Hyderabad, India. The programme was inaugurated by Prof. Arjula Ramachandra Reddy Vice Chancellor, Yogi Vemana University, Kadapa, AP and VC (I/C) Sri Krishna Devarya University, Ananthapur, AP. On 05/05/12 Dr. Sharda have presented a paper on RAPD variants of Indian varieties of cumin in session I, Track 3-1.





Global Conference on Horticulture attended by Scientists

Global Conference on Horticulture attended by NRCSS scientists for food, nutrition and livelihood options held on May 28-31, 2012 at Bhubaneswar and Orissa. Research paper on Fennel (*Foeniculum vulgare* Mill) based on inter cropping system was presented in poster session of the conference. During the conference an exhibition of our centre was also laid for display of improved production technology of seed spices. Delegates of the conference and farmers of the region visited to our stall. The queries of the farmers were addressed.

Dr. S. N. Saxena attended IFT Annual Meeting & Food Expo 2012

Dr. S. N. Saxena, Senior Scientist Plant Physiology attended IFT Annual Meeting & Food Expo 2012 organized by the Institute of Food Technologists at Las Vegas Convention Centre, Las Vegas Nevada, USA during June 25 to 28, 2012. This visit was sanctioned in the NAIP IV project titled "Studies on Cryogenic Grinding for Retention of Flavour and Medicinal Properties of Some Important Indian Spices". Dr. Saxena is CCPI of this project.



Dr. Saxena with Dr. Vijay K. Juneja, Lead Scientist, US Dept of Agricultural Research Service and recipient of Research and Development award 2012 (left) and Dr. Ravishankar Gokare (right) Chief Scientist Central Food Technological Research Institute (CSIR-CFTRI), India admitted as the Fellow of IFT Society

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More than 18000 food industry professionals were gathered in the meeting. The scientific programme boasted more than 100 education sessions and 12000 posters presentations including key note address delivered by Starbucks president, CEO and Chairman Howard Schultz and Bacon lectures delivered by Dr. Mehmood Khan CEO, Global Nutrition Group and Chief Scientific Officer of PepsiCo and Jose M. Saavedra, Medical and Scientific Director for Nestle Nutrition and a member of the faculty at the Jons Hopkins University School of Medicine. The programme has been organized around seven key focus areas and four core sciences. The key focus area programme tracks are Food safety and defense, Food health and nutrition, Food processing and packaging, Product development & Ingredient innovations, Sustainability, Public

policy, Food laws and regulations and Education & Professional development. The core science programme tracks were Food Chemistry, Food Microbiology, Food Engineering and Sensory Science. In IFT Food Expo more than 900 companies from around the World and more than 1,900 booths were there as exhibitors. Spice Board of India, Cochin along with other Indian exporters mainly deals in spices exhibited their products and technology in Food Expo.

Dr Ravindra Singh, attended and delivered lecture in the Conference on "Indian Spices best for Export" at PHD House, New Delhi.

Dr Ravindra Singh Singh has attended the meeting and conference on 07th June, 2012 on "Indian Spices best for Export" organized by PHD chambers of Commerce and Industry at PHD House, New Delhi. The discussion was on emerging market trend for Indian spices, trading of spices through commodity exchanges, development in packaging of spices, radiation technology to preserve the quality of spices, and seed spices research a need and update. Dr Singh also presented invited lecture on "**Indian Spices best for export quality: Seed Spices Research- A Need and Update.**

Dr Ravindra Singh attended Meeting of Task Force Committee for Seed Spices, organized by Spices Board

Dr Ravindra Singh, Senior Scientist has attended a meeting of **Task Force Committee on Seed Spices** on 15th June, 2012 organized by Spice Board, Cochin held at Commodity Exchange Building, Indian Merchant Chambers, Vasi, Navi Mumbai. The discussion was held on statistics of seed spices including target for export during 2012-13 and export performance during previous year, state wise crop position (Cumin, coriander, fenugreek, fennel, celery) for current and ensuing year, future export prospects of seed spices, competition with other seed spice producing countries of the world, global demand of seed spices, quality requirement of world market, pesticide residue problems in seed spices, adulteration problems in seed spices etc.

Study tour of Dr. G. Lal to Texas A & M University

Dr. Gopal Lal, Pr. Scientist and Director, (Acting) visited Texas A & M University under the invitation of Dr. Bhanu Chowdhary Asso. Dean for Res. & Graduate Studies Texas A & M University, USA with respect "To acquaint with state art of techniques in post harvest management of horticultural crops.. He visited different







Dr. Gopal Lal visited different labs and interacting with Scientists of TAMU

laboratories of this university like processing for value addition, Processing for product manufacturing (perishables), Processing of peels, seeds etc for more profit, Hi-tech treatments for increasing the shelf life of horticultural produce and



Dr. Gopal Lal in a field of musk melon with the Scientist of TAMU

interact to different scientists of the laboratories and cooperative societies. Dr. G. Lal also saw different field crops and their processing in USA.



Dr. Gopal Lal in processing and caning factory and doing interaction with scientists

Cigarette beetle, *Lasioderma serricorne* Fab - A serious pest of stored seed spices.

Krishna Kant and Siya Ram Meena,NRCSS,Ajmer



Seed spices are generally stored for a year or more at farmer/traders level. In most cases insect infestation come from field and other sources is the store house. The insect infestation generally remains undetected until adult are seen. By the time these adult are detected much of seed are already damaged. The most common species infesting seed spices during storage are cigarette beetle *Lasioderma serricorne* Fab., Drugstore beetle *Stegobium panicum* L. and Seed Spices wasp *Systole albipennis* Walker Others are Red rust flour beetle *Tribolium* spp., Rice moth *Corcyra cephalonica* and Almond moth (*Cadra cautella* Syn. and *Ephestia cautella* Walker) Infestation level during storage is highly dependent on temperature, humidity, seed moisture and type of storage. Cumin, coriander, ajowan and anise suffer most during the storage. Stored insects not only causes quantative losses but also affect the qualitative losses such as losses of oil contents, harbouring microorganism and chemical changes. Among different stored insect pests attacked, cigarette beetle, *Lasioderma serricorne* Fab. .(Coleoptera: Anobiidae) causes maximum damage and found all agro climatic zone of the country.



Cryogenic Grinding: A novel approach for retention of flavour and medicinal properties of seed spices

S. N. Saxena, S. S. Rathore and Rohit Saxena, NRCSS, Tabiji, Ajmer

Seed spices like cumin, coriander, fennel, ajowain, dill and anise are known for their pleasant aroma and medicinal properties. The main processed product of spices is Ground powder. Processed spices demand is continuously increasing in domestic as well as world market. Due to high fat content in spices, in the normal grinding process, heat is generated when energy is used to fracture a particle into a smaller size. This generated heat causes temperature rise in the grinder to the extent of 95^{o}C which is responsible for a loss of volatile oil in the tune of about 30% and also produces dark colour powder. The loss of volatile can be significantly reduced by cryogenic grinding technique using liquid nitrogen or liquid carbon dioxide that provides the refrigeration needed to pre-cool the spices and maintain the desired low temperature by absorbing the heat generated during the grinding operation.

In the process of cryogenic grinding the material is feed into a feeder hopper and dropped into a conveyor where the material to be processed enters the pre-chilled conveyor. Liquid nitrogen is then sprayed and blended directly onto the material. The material is conveyed via a stainless steel special design auger. The auger not only transports the grinding media, but also mixes it with liquid nitrogen for greater cooling efficiencies. Liquid nitrogen is added until the temperature of the material is reduced to a predetermined set point. This set point is the glass transition temperature of the material. The extremely low temperature in the grinder solidifies oils so that the spices become brittle, they crumble easily permitting grinding to a finer and more consistent size. Finally the brittle material enters an impact (pin) mill where it is ground to a desired particle size. The high quality ground product would have domestic as well as international market.

The finding of the project titled “Studies on cryogenic grinding for retention of flavour and medicinal properties in some Indian spices” running at NRCSS, Ajmer under NAIP showed that cryogenic ground coriander and fenugreek seeds were superior in terms of volatile oil content, total oil content and antioxidant properties.

Table-1 Antioxidant Content, DPPH Scavenging % and EC_{50} value o f methanol crude extract from conventional and cryogenically grounded seeds of coriander genotypes

Genotypes	Non cryo ground			Cryo ground		
	Antioxidant Content	DPPH Scavenging %	EC_{50}	Antioxidant Content	DPPH Scavenging %	EC_{50}
Acr 1	3.44	28.62	6.01	6.57	53.21	6.17
Australia	6.00	48.72	6.16	8.00	64.42	6.21
RCr 41	5.15	42.07	6.13	7.74	62.41	6.20
RCr 435	5.94	48.26	6.16	6.83	55.22	6.18
Sudha	4.92	40.22	6.11	10.21	81.83	6.24
Swati	6.28	50.89	6.17	7.89	63.57	6.21
Sadhna	5.73	47.41	6.05	10.85	86.85	6.25
Sindhu	2.37	20.19	5.87	5.09	41.53	6.12
RCr 436	6.47	52.44	6.17	8.72	70.07	6.22
CD (0.05)	**0.353**	**2.703**	**0.106**	**0.046**	**0.357**	**0.0013**
CV (%)	**3.961**	**3.711**	**1.003**	**0.329**	**0.321**	**0.0117**

Table-2 Total Anti-oxidant Content, DPPH Scavenging %, and EC_{50} value in distilled water, methanol and ethyl acetate crude seed extracts of cryo and non cryo ground seeds of Fenugreek genotype

Genotypes	Total Anti-oxidant Content (mg/g BHTE /1000 ppm crude extract)			DPPH Scavenging %			EC_{50} (mg/g BHTE /1000 ppm crude extract)		
	DW Extract	Methanol extract	Ethyl Acetate Extract	DW Extract	Methanol extract	Ethyl Acetate Extract	DW Extract	Methanol extract	Ethyl Acetate Extract
AM 1 (Cryo)	11.963	10.720	8.460	96.345	85.847	68.291	6.209	6.244	6.214
AM 1 (N cryo)	11.777	9.540	5.140	94.672	76.566	41.995	6.221	6.230	6.120
RMT 305(Cy)	11.993	10.710	8.797	96.618	85.770	70.688	6.207	6.243	6.217
RMT 305 (NCy)	11.203	9.680	6.067	89.580	77.649	49.265	6.253	6.233	6.157
Mean	11.734	10.163	7.116	94.304	81.458	57.560	6.222	6.238	6.177
SEM	0.003	0.012	0.037	0.033	0.089	0.278	0.002	0.000	0.002
CD 0.05	0.010	0.040	0.129	0.113	0.309	0.962	0.005	0.001	0.006
CV %	0.043	0.197	0.907	0.060	0.190	0.836	0.044	0.007	0.045

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