NRCOG NEWS

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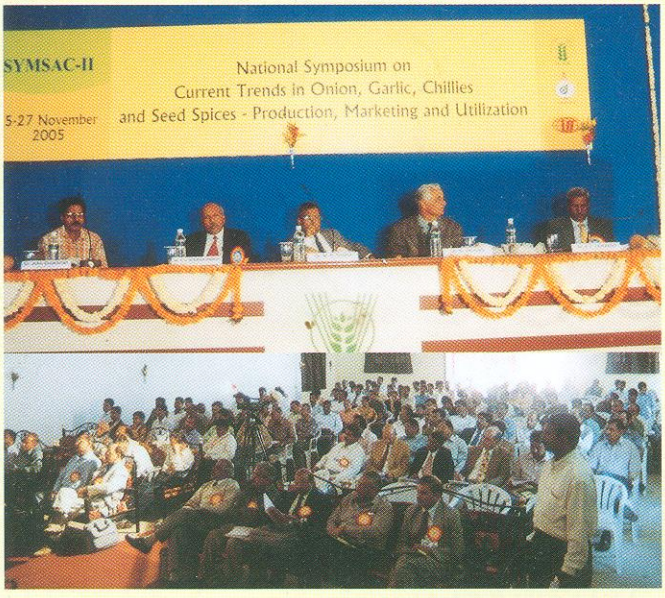
NRCOG Organized National Symposium, SYMSAC-II

NRC for onion and garlic organized National Symposium, SYMSAC-II, on **"Current trends in onion, garlic, chillies and seed spices - production, marketing and utilization"** during 25-27 November 2005 at Rajgurunagar, in collaboration with Indian Society for Spices, Calicut, NRC for Seed Spices, Ajmer and Indian Council of Agricultural Research, New Delhi.



Dr. G. Kalloo, DDG (Hort.& Crop Sci.), ICAR inaugurated the Symposium. Dr. M. R. Thakur, Ex-VC, Dr. Y. S. Parmar University of Horticulture and Forestry presided over the function. Dr. K. E. Lawande, Director NRCOG and Chairman of the SYMSAC-II welcomed the delegates. Dr. V. S. Korikanthimath, President, ISS briefed the activities of the society and Dr. T. John Zachariah, Secretary, ISS introduced the technical sessions of the souvenir. On this occasion chief guest Dr. G. Kalloo, DDG (Hort.& Crop Sci.) released publications of SYMSAC-II and presented J. S. Pruthi award for best paper published in Vol.13 (2004) of Journal of Spices and Aromatic Crops to Dr. Sasikumar *et al.* He also presented Premnath Foundation award to Dr. S. K. Malhotra, Senior Scientist for developing improved varieties in seed spices. Dr. V. S. R. Krishna Prasad, Principal Scientist (Hort.) and convener of SYMSAC-II proposed the vote of thanks. 175 delegates from all parts of the country attended the three-day symposium.

SYMSAC-II, National Symposium has been covered in following theme areas in seven technical sessions.

1. Biodiversity, Genetics, Breeding and Biotechnology (Crop Improvement)
2. Sustainable Production System (Crop Production)
3. Plant Protection
4. Processing and value addition

5-6. Trade and policy issues & farmers' interface.

7. Economics and Marketing

Dr. Kirti Singh, Ex-Chairman ASRB, Dr. Nawab Ali, DDG (Engg.), Dr. Nerkar, Ex-VC, MPKV, Rahuri & Director VSI, Pune, Dr. R. K. Chowdhury, OSD, Directorate of Seed Research Dr. Mathura Rai, Director, IIVR, Dr. K. R. Koundal, Project Director, NRC for plant biotechnology, Dr. P. G. Adsule, Director, NRC for Grapes, Dr. S. J. Singh, Ex-Head, IARI Regional Station, Pune, Dr. V. B. Patil, Director of Horticulture, Pune, Shri S. Dave, Director, APEDA attended the symposium and participated in

different technical sessions. During the sessions, the related issues were discussed in detail with good interaction among the scientists.

Dr. Alapati Prasad Rao Best Poster Award was presented to the poster entitled "Gujarat Cumin - 4, a new wilt resistant cumin variety having high yield potential and better seed quality in India" authored by K. P. Patel, N. R. Patel, and A. V. Agalodiya, Main Spices Research Station, S.D. Agricultural University, Jagudan, Gujarat. Cash prize was awarded to a poster entitled "Preliminary screening of garlic varieties through RAPD technique" authored by Dr. Anil Khar, Asha Devi and K. E. Lawande. Following salient recommendations emerged out of presentations and discussion.

1. Re-orientation of research towards development of resistant varieties coupled with good storage in onion and garlic, low capsaicin and high oleoresins in chillies and more flavour in seed spices.
2. There is need for development of chilly varieties for possessing with low capsaicin and high oleoresin content to exploit the great export potential.
3. Work on development of photo and thermo insensitive parental lines in spices must be taken up on priority and these can be exploited for the development of two line hybrids in these crops.
4. There is an urgent need for development of seed certification standards in seed spices.
5. Source of resistance for diseases in seed spices should be located and breeding for incorporation of resistant genes should be initiated.
6. Data base on biochemical analysis of spice varieties must be developed on priority basis for establishment of brand name for export.
7. The use of drip irrigation with 100% PE was found useful for higher yield and quality with 35-40% water saving over surface irrigation in onion and garlic. The use of micro irrigation should also be tried in chillies and seed spices. The findings of micro irrigation should be demonstrated on large scale on farmers' field through frontline demonstration schemes.
8. The *kharif* onion plays an important role in price stabilization. There is a need to do more research on various aspects of *kharif* onion such as planting system, direct sowing, curing *etc* in all the *kharif* growing belts of the country under a coordinated programme. Available results should be demonstrated in *kharif* onion growing areas of Maharashtra, Karnataka and Rajasthan.
9. Epidemiology of economically important diseases may be worked out and disease-forecasting models should be developed.
10. The work on survey and preparation of insect pest map of onion, garlic and seed spices in different agro climatic zones should be taken up.
11. A dynamic database on pathogens, insects, weather and cropping system must be developed for planning biotic stress-free production.
12. Frontline demonstration of newly developed top and bottom ventilated mud thatched storage structure may be set up at the village level or with some progressive farmers to popularize the structures.
13. Since irradiation helps in hygenization of spices, irradiation facilities should be created in all AEZs.
14. Cost effective ventilated containers for transport of onion should be made available.

15. By adopting appropriate *kharif* onion production technology, Karnataka, Maharashtra and Rajasthan should boost *kharif* onion production to bridge the gap particularly during October and November.

16. NABARD may come forward to finance integrated training programmes to the farmers of major onion growing states in the field of production and post harvest handling of onion and refinance for agri-export zones.

Preliminary Screening of Garlic Varieties Through RAPD Technique

Although seed sterile, garlic displays considerable variability in morphological features like bulb size and colour, scape height, flower characteristics, number and size of bulbils and cloves, as well as in physiological properties such as time of maturity, storability and dormancy. In India, different cultivars belonging to temperate and tropical types are adapted to a wide range of climatic regions. Morphologically, these varieties have been characterized but the environmental conditions lead to biasness in the discrimination of varieties in assessing their relationship. Hence molecular markers, which are neutral in nature, can be used to assess the diversity present among the varieties. Keeping this in view, 23 garlic varieties and elite lines as well as one onion line as out-group were used for DNA fingerprinting through Random Amplified Polymorphic technique (RAPD). Polymerase chain reactions (PCR) were carried out using 40 random decamer primers (Operon Technologies, California). Out of the 40 primers screened, 5 primers showing polymorphism were selected. The reactions were replicated four times to check their reproducibility. Only bands, which gave at least one distinction between the accessions, were scored.

The resultant dendrogram showed the presence of four clusters. Cluster I was the biggest one with 14 genotypes with a similarity index of about 90%. Cluster II consisted of only one genotype, SKAUG 151. Cluster I was related to Cluster II at about 75%. Cluster III was the second biggest one with 8 genotypes being grouped together, at a distance of about 66%.

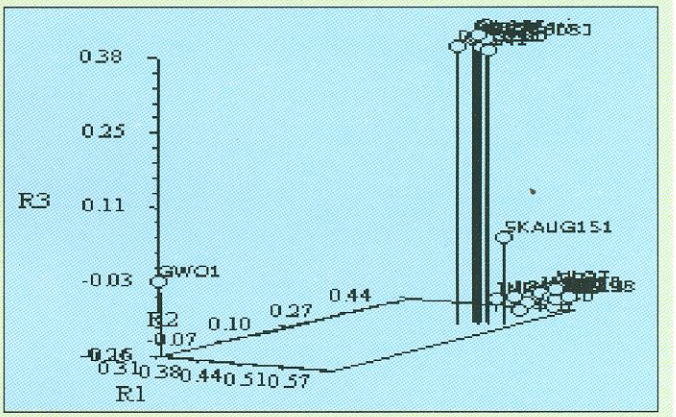


Fig. 1: Three dimensional plot of principal component analysis

Cluster IV showed the out group i.e. onion genotype. About 44% variation was noticed amongst the garlic accessions.

In Cluster I, there were two ball clusters (G1 and G50 & G313 and KGS2). The similarity index was 0.98 for both the clusters. This close similarity suggests a probable common parentage for G1 and G50 as well as G313 and KGS2. Cluster II also showed a single ball cluster between Godavari and RAUG5 with a similarity value of 0.98. PCA analysis was also done and the results (Fig. 1) were comparable to cluster analysis. Garlic breeding line SKAUG 151 and onion accession GWO-1 formed separate clusters whereas all other genotypes were grouped into two other clusters. In conclusion, the range of similarities for the garlic cultivars investigated varied from 66-98 per cent, which indicate a high level of genetic variation.

Genotypic Response of Garlic (*Allium sativum* L.) for Callus Culture and Regeneration

Being a sexually sterile species, till date, garlic breeding has been limited to clonal selection of land races or spontaneous mutants. However, creation of variability is possible through callus cultures. Even development of new cultivars by genetic transformation is also feasible nowadays.

Fig. 2 : Root tip of G-41 producing callus in MS medium fortified with 2,4-D(0.25 mg/l) + BA (2.25 mg/l)

Success of any genetic transformation programme depends on the availability of a highly efficient callus induction and regeneration system.

Tissue culture response in most cases is genotype dependent. Hence, a study was initiated to understand the effect of different short day garlic genotypes towards callus induction and regeneration using root tip explant. Callus was raised from three garlic genotypes (G - 41, GG - 3 and Godavari) in two MS based induction media fortified with different concentrations of 2,4-D (0.25 mg/l) and BA (1-2.25 mg/l). Both the induction media resulted in the formation of 70 - 100% callus induction (Fig. 2). Regeneration of shoots was observed upon transfer to regeneration media, containing BA (1 - 2.25 mg/l). However genotypic differences were evident during callus regeneration. Of the three genotypes, G - 41 and GG - 3 produced shoots, whereas, Godavari failed to induce shoots. Maximum number of shoots (18-20 shoots) (Fig. 3) per gram of callus was recorded

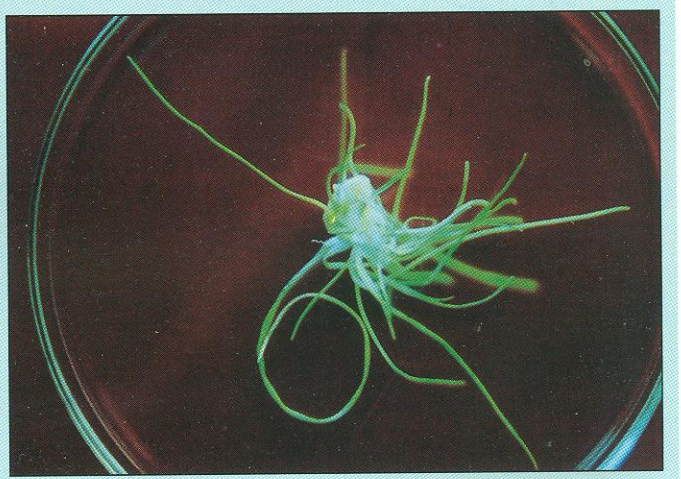


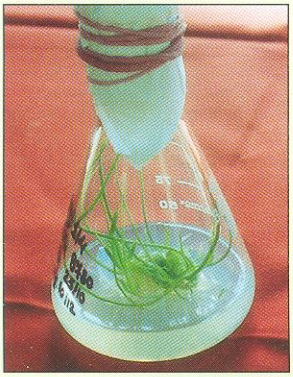
Fig. 3 : Root tip callus of G-41 in MS medium fortified with BA (2.25 mg/l) inducing shoots

in G - 41 followed by GG - 3 (8-10 shoots / g callus). This study clearly indicated that genotype plays an important role in tissue culture responses of garlic.

In *Vitro* Shoot Multiplication Studies in Onion var. B-780

There has been considerable interest in the potential of tissue culture for the improvement of bulb onion. Although several studies were carried out in onion tissue culture, most of the work has been done in the long day type. Indian onion belongs to the short day type and work on this group is very limited. Onion var. B-780 is a high yielding, red variety with globose shape and suitable for *kharif* and late *kharif* seasons.

An attempt was therefore made to standardize micro propagation protocol *via* shoot multiplication in this variety. In the present protocol, shoot tip from seedlings of onion *var.* B-



780 was used as the explant. Six different shoot multiplication media were tried containing different combinations and concentrations of the cytokinins, BA and Kinetin in MS medium. The results showed that BA was superior to Kinetin. Shoot induction with BA (1-2 mg/l) was higher (12 - 14 shoots) (Fig. 4), than Kinetin (4 shoots / explant). Further, Kinetin induced shoots only at higher concentration (10 mg/l). This protocol was found reliable for efficient micro propagation of short day onion var. B-780.

Fig. 4: Shoots induced from shoot tip explant of var. B-780 in MS medium fortified with BA (2 mg / l)

Pink Root Disease in Onion

The fungus, *Phoma terrestris*, causes pink root in onion. As the name suggests, infected plants show light pink roots that turn to deep pink and purple brown as the roots disintegrate. New roots may continue to form (Fig. 5). Leaves turn white, yellow or brown tip downwards and finally die. The infected plants can be easily pulled out. Bulb development gets hampered. This disease is not so common in India and the diseased plants were observed during *kharif* season. The fungus is considered as a weak fungus and survives in the soil, infected plants and debris. The disease can be spread through movement of soil and water. Soil temperature plays a major role in the development of the disease. Practices such as long crop rotation with non-hosts like cereals, soil solarisation and fumigation also helps in reducing the disease.

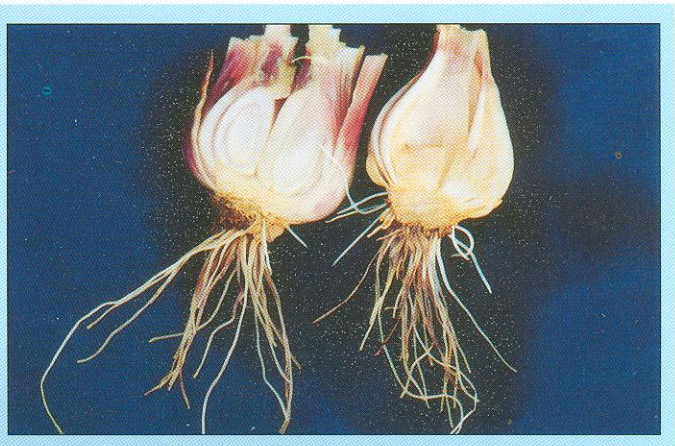


Fig. 5 : Bulbs affected by pink root

Transfer of Technology

- NRCOG has participated in the exhibition "Kisan" at Moshi, Pune organized by Kisan forum during 14-18 December 2005.
- A three-day training programme was organized during 27-29 December, on "Production, post harvest technology of onion and garlic" for farmers from Andhra Pradesh. Thirty five farmers attended the training programme. The trainees were exposed to improved technologies in production, pest management, storage, value addition and marketing through lectures and field visits. The farmers interacted with the growers and traders during field and market visits and acquired first hand information.

From Director's Desk

Year 2005 once again experienced un-usually high prices of onion after 1998. High rainfall (800-1000 mm) from June to October in most of the *kharif* onion growing areas spoiled the crop. The stored onions produced in last *rabi* sprouted and rotted due to constant high humidity. The stock was exhausted in September only. Since *kharif* crop failed, the arrivals of onion during October to December were very poor resulting a critical gap in supply. The prices shoot up to Rs. 20/- per Kg of onion in almost all markets. Due to water stagnation from June, high incidence of *Colletotrichum* was noticed. As a result, yellowing of leaves, twisting of neck region with few dangling leaves occurred. Affected plants did not form bulbs. Once again *kharif* crop underlined its importance. The phenomenon of 1998 was repeated. Poor storage of *rabi* produce coupled with spoilage of *kharif* crop or late planting of *kharif* crop always leads to shortage of onion from October to December. While anticipating this problem NRCOG tried to address this issue by enhancing productivity of *kharif* onion by developing appropriate technology, which assures productivity under adverse climatic conditions. This includes raising early nursery in summer with the help of BBF with drip or sprinkler irrigation and provision of partial shade over the beds, planting of seedlings on BBF with drip or sprinkler irrigation, providing effective drainage and use of foliar sprays of water soluble fertilizers.

With this technique even under high rainfall, there was good harvest to the tune of 25 ton/ha at NRCOG farm, while there was partial to complete failure of onion planted in flat beds with farmers. There is a need for demonstration on farmers' fields.

Our New Colleague

Dr. C. R. Ramesh, Principal Scientist (Plant Pathology), joined this centre on 17 September 2005. He will be working on Integrated Disease management in onion and garlic.

Training to the Officers

NRCOG offers training to Agricultural and Horticultural officers, onion growers and traders on the following aspects of onion and garlic

- Improved varieties and hybrids of onion and garlic
- New agro-techniques in onion and garlic
- Pest and disease management in onion and garlic and Storage of onion and garlic
- Marketing and trade in onion and garlic

For further details, contact Director, NRCOG

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NATIONAL RESEARCH CENTRE FOR ONION AND GARLIC
Rajgurunagar-410 505, Pune Dist. Maharashtra, India. Phone : 02135-222026. Fax : 02135-224056. Email : director@nrcog.res.in
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