

From the director's desk

January -June is the period for *rangda* (Late *kharif*) and *rabi* harvest. Rangda harvest of onion always witnessed high yield and heavy rush in the market from Jan-Feb; as a result there is sharp decline in prices especially in Maharashtra. Market management of *rangda* crop has become a sensitive issue for Maharashtra government in the past. High yield with good quality but low storage compels farmers to sell out the produce before main *rabi* crop is harvested. In haste, every farmer wants to sell the produce in Jan-Feb resulting in to a glut. Opening of export, short term holding of stock, crop planning, use of varieties with better shelf life up to June, quick domestic marketing *etc* are some of the solutions for management of glut. The year 2007 was an exception to the trend as the prices increased right from November and remained above Rs.10/kg up to June. Probably after 15 years, *rangda* growers were more than happy. This has resulted in to more demand for seed in *kharif* 2007.

In case of garlic the prices were high all through the season, the garlic farmers who were rather keeping safe distance again thinking of increasing area. High seed cost and other inputs resulting in increase of cost of production make garlic production unattractive. Selection of better variety, planting on Broad Based Furrows with drip or sprinkler irrigation ensures 6 to 8 tons of saleable garlic per hectare. With an average farm price of Rs.15 to 20/kg can make garlic as profitable venture. We standardized the techniques of garlic production on BBF with drip irrigation, which besides ensuring high productivity, saves water (40%), labour (30%), fertilizers (30%) and also provides comfort in irrigation.

During the period under report, one onion variety B-780-5-2-2 has been identified for release through AICRP programme for Zone VI (Rajasthan, Gujarat, Haryana, Delhi). Besides Bhima Super (single centered) and B-780-5-3-1 (R) has been released at Centre level for *kharif* and late *kharif* season. In case of garlic AC-200 and AC-50 found superior in performance. Besides high dignitaries 2000 farmers visited the Centre during recently organized Kisan Mela.



 B-780-5-2-2 released for Zone VI

Research achievements

Genetic inheritance of bulb color genes in Onion

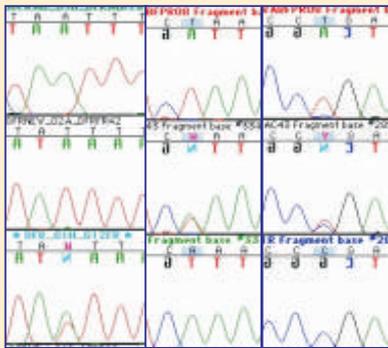
Bulb color in onion is controlled by five major genes I, C, G, L and R. The biochemical pathway for the development of colour has been studied in other crops and is very well understood. In case of onion, reports about the genes involved for color have been identified on the basis of genetic level. In case of molecular studies, not much work has been done. Our research was to identify SNP's (if any) in various genes involved in the pathway of color development and to see whether they can be used to identify the



Families segregating for colour

complimentary genes conditioning light red bulb color at early stages in order to save the time needed to recognize them after several generations of inbreeding.

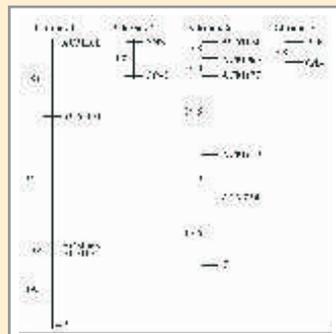
We worked on different candidate genes viz., CHS A (Chalcone synthase), CHS B, F3H (Flavanone 3- hydroxylase), ANS (Anthocyanidin synthase) and DFR (Dihydroflavonol 4-reductase). If the SNP's (Single Nucleotide Polymorphism) were obtained in the parents, it was confirmed in the progeny and then mapped on the onion chromosomes.



Single nucleotide polymorphism in the breeding populations of onion



Linkages among simple sequence repeats (ACM) and the B and C loci in onion



In case of CHSA, CHSB and F3H, no SNP's were obtained in the parents and off springs. In case of ANS and DFR, SNP's were obtained which were further confirmed in the progeny. Based on the results obtained, we proposed the genetic model for red bulb colour in onion. Our analysis support DFR as the R locus of onion, however, duplicated copies of DFR may also control the appearance of red bulbs. Also in case of ANS, we identified a second locus (L2) linked at 6.3 cM to ANS on chromosome 4. We proposed that yellow bulb onions have been independently selected numerous times from white or red populations and that yellow onions carry independent mutations in structural or regulatory genes controlling the production of anthocyanins. Two of these genes are DFR and ANS and corresponding to the R and L loci. Our results demonstrate that dominant alleles at both DFR and L2, an additional locus also condition red bulb colour in onion.

In vitro gynogenesis in onion

Gynogenesis for haploid induction in onion has immense potential in breeding programme. It will bring down the period of development of inbred lines from twelve years through conventional breeding to two to three years. In India, in vitro gynogenesis is reported here for the first time using unopened flower buds of short day onion varieties. Plants formed directly from the ovary were further multiplied and transplanted to the field successfully.



Single plant arising from the ovary directly without an intermediate callus phase

Garlic based cropping sequences

Studies on sequential cropping of well-delineated agro ecological zone would help in optimization of nutrient inputs thereby minimizing the external inputs. In recent years, soil fertility - fertilizer use research is focused on cropping sequences. The escalating cost of chemical fertilizers, impaired quality of produce, degraded soil and polluted surroundings necessitated the practice of cropping systems for vegetable production in recent years. So far, there is no prominent cropping system for garlic. Garlic based cropping sequence is to grow two or more crops in a sequence in a year in the same piece of land. Studies were carried to find out

the most economically viable, environmentally suitable and socially acceptable garlic based cropping sequences. Among the different sequences evaluated, higher marketable bulb yield (11.2t/ha) was noticed in soybean-garlic sequence. Higher B: C ratio of 3.42 was obtained in groundnut (summer) - garlic (rabi) sequence followed by soybean (kharif) garlic (3.09).

There was an improvement in physical and chemical properties of soil like organic carbon, organic matter, available N, P and K content in legume based cropping sequences like soybean-garlic and groundnut- garlic compared to other sequences.

Thrips damage to stored onion bulbs

Thrips not only cause damage to onion plants in field but also cause damage in stores. Due to feeding, the outer scales of the bulbs are discoloured and show patches. Although the damage is not quantitatively significant, it impairs the quality of the bulbs particularly appearance. This cosmetic damage may deter the export market. Therefore the presence of thrips, their nature and extent of damage was studied on stored onions. Damage was noticed on all

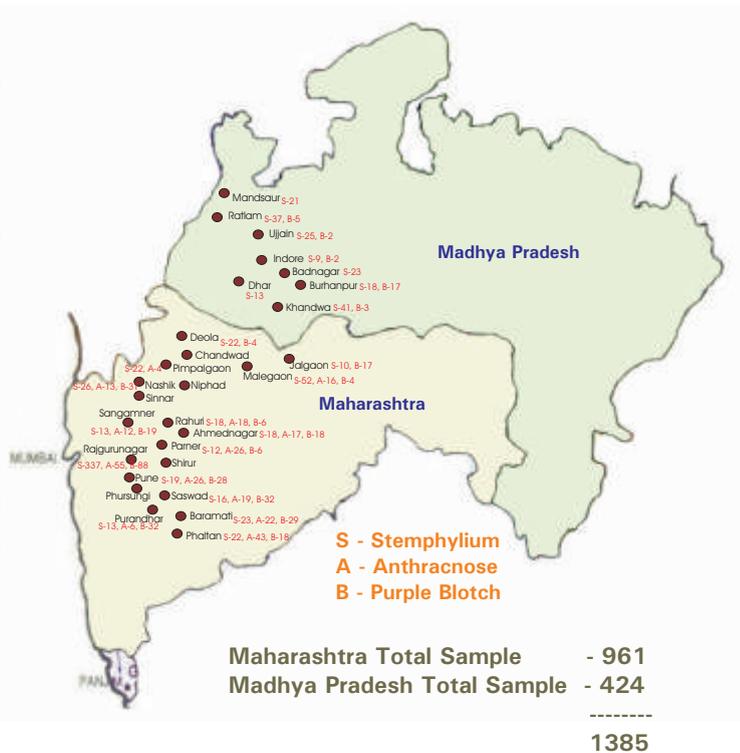


the bulbs that were sampled. The upper half of the bulbs was more damaged than the lower half. On an average 0.8 thrips per bulb was observed. There was no relation between neck thickness and thrips population or damage on bulbs. On an average thrips penetrated up to 1.1 scales. The damage was not progressing with period of storage, suggesting that the damage on bulbs occurred in the initial stages but not later. Moreover, thrips were not multiplying on bulbs during storage.

National fungal isolate collection initiated

Field and storage diseases reduce profitability of onion production in the country. Field diseases include purple blotch, stemphylium blight, anthracnose, pink root, and several basal rots. Storage diseases include some of the common field rots, black mold, botrytis neck rot and bacterial soft rot. All the fungal diseases are limiting factors for onion production and cause more than 50% loss in the field and storage. No attempt has been made to make the pathogenic and genetic clustering of the pathogens. Using the molecular and pathogenic clustering data risk assessment of genotypes for different agro climatic regions can be made. National isolate collection of the major fungal pathogens of onion and garlic has been started following hierarchal sampling using GPS in Maharashtra and Madhya Pradesh. Major GPS sites of the location are marked in the map along with the number of isolates collected from each site.

GPS Sampled Locations and origin of isolates



Institute Meetings

Brain storming on pests and diseases



A brain storming session on “ Onion pests and diseases: Status and future thrust” sponsored by NHRDF, Nasik, was conducted at the center on 16-17 Jan 2007. Dr. K.E.Lawande, Director delivered the inaugural address and status report with Dr. G. Kalloo, Former DDG (Hort.) in the chair and Dr. B.L. Jalali, Ex- Director of Research, HAU, presiding over the occasion. Around 32 Scientists from all over India attended and actively participated. In an open-ended discussion all the participants expressed their views and thoroughly discussed on various aspects of major pests and diseases like thrips, purple blotch, stemphylium blight etc. During the 2 days deliberations, an action plan along with technical programme was formulated.

Research Advisory Committee meeting

The tenth RAC meeting was held on 21-22 March 2007 at Rajgurunagar under the chairmanship of Dr. M.R. Thakur. Among the members, Dr. V.S. Seshadri, Dr. K.E. Lawande, Dr. S. N. Pandey, Dr. S.J. Singh, Dr. Nazir Ahemad, Dr. S. H. Shinde, Shri Suryakant Palande, Shri C.B. Holkar and Dr. Vijay Mahajan (I/c Member Secretary) and all the scientists of the center attended the meeting. The members visited the experimental plots at the center. Dr. K.E. Lawande, Director presented the progress of research work and the results along with action taken report of IX RAC. The Chairman and members expressed their satisfaction over the research programmes, farm management and infrastructure facilities developed at the center. The committee critically reviewed the progress and the appropriate suggestions were recommended.



IRC

The X IRC meeting was held on 17-18 March 2007. Under the chairmanship of Dr. K.E. Lawande, Director, all the scientists have presented the results of various projects and progress made in the previous year and technical programmes were thoroughly discussed and finalized.

QRT

The QRT team headed by Dr. K.V. Peter, Ex- VC, Kerala Agricultural University visited NRCOG along with other members, Dr. Brahma Singh, OSD (Hort), Rashtrapati Bhavan, Dr. A. K. Mishra, Ex- Additional Commissioner (Hort.), Dr. Lalita Anand Ex- Head, Biotechnology, IIHR, Dr. N.S. Rao, Principal Scientist, PDBC and Dr. V.S.R. Krishna Prasad, Member Secretary. The team conducted three meetings on 29-30

December 2006, 12-16 March 2007 and 15-19 April 2007 and discussed with the scientists about the targets and achievements and assessed the progress made in their research programmes. The team also had discussion with the staff and visited experimental farms, seed production plots and farmers fields to witness the technology dissemination. The team also visited NHRDF, Nasik, Lasalgaon, BARC irradiation center facility and agricultural marketing yards and had discussion with the officials. The team complemented the Director and scientists for achieving good results in all fronts. The team has submitted report to the ICAR.



IMC

The XII IMC of the center was conducted on 5 June 2007 under the chairmanship of Dr. K.E. Lawande, Director. Other members, Sh. C.B. Holkar, Sh. S.G. Palande, Dr. V.S.R. Krishna Prasad and Mrs. S.S. Joshi, Member Secretary also attended the meeting. Members were briefed about the achievements in respect of

infrastructure development and other activities. The recommendations of the recently concluded QRT were thoroughly discussed and approved. The committee examined the expressed satisfaction over the utilization and appropriate flow of funds, purchase of equipment and revenue generation etc.

National seminar and Kisan mela

NRCOG organized the 2-days National seminar and kisan mela sponsored by NHRDF, Nasik and Indian Society of Alliums on 27-28 February 2007 at Rajgurunagar. Dr. R.B. Deshmukh, VC, MPKV, Rahuri was the chief guest on the occasion while Dr. H.P.Singh, DDG (Hort) presided over the function. Other distinguished guests attended the seminar include Dr. V.D. Patil, Director of Horticulture, Pune, Sh. B.V. Gopal Reddy, M.D.,

Maharashtra State Horticulture and Medicinal Plants Board, Sh. C.B. Holkar, Vice chairman, NAFED, Dr. R.P. Gupta, Director, NHRDF. On this occasion, an exhibition was organized in which many private companies that are dealing with seed, agricultural input, farm machinery and irrigation and scientific equipment as well as department of horticulture, PSUs, NHRDF etc actively participated. Around 2000 onion- garlic growers from Madhya Pradesh,



Release of Publications

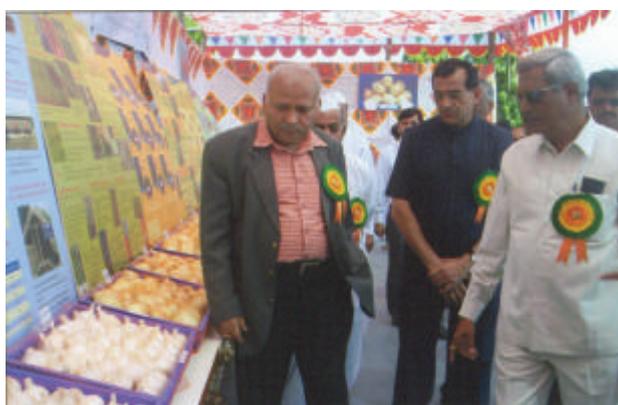


Section of audience

Rajasthan, Maharashtra and other parts of the country benefited during the two days seminar. Different technical sessions were conducted in which, the experts delivered lectures on the topics like production, processing, storage, retail marketing, export, and Government, NABARD schemes. This facilitated the farmers to have direct interaction with the experts and shared their experiences and problems they are facing. For efficient dissemination of technologies developed at the centre, CDs on *Kharif* onion production

technology, integrated pest and disease Management, NRCOG were released, for the benefit of farmers.

On this occasion, 10 progressive farmers and exporters of onion and garlic were felicitated for their contribution in adopting modern crop production and storage technology in onion and garlic. To encourage the growers, onion and garlic produce competition was organized and prizes were distributed for the best entries under different bulb and seed categories.



 Visit to exhibition



 Visit to demonstration plots

Distinguished Visitors

New DDG (Horticulture)

Dr. H.P. Singh, DDG (Horticulture) has made his maiden visit to the center on 18 February 2007. Dr. K.E. Lawande, Director and scientists congratulated and welcomed Dr. Singh, who recently joined as new DDG. Director presented status of onion and garlic research and achievements of the center. Dr. Singh visited the experimental farm and discussed the programmes with the scientists in brief. He expressed satisfaction about the growth and achievements of the Centre.



Dr. Harihar Ram, Chief, R&D, KVSIPL, Pune	01/02/2007
Mr. S.K. Pattanayak, Director, NHM, New Delhi	24/02/2007
Dr. R.B. Deshmukh, Vice-Chancellor, MPKV, Rahuri	27/02/2007
Mr. B.V. Gopal Reddy, MD, MSHMPB, Pune	28/02/2007

Priced publications of NRCOG

Name of Bulletin	Cost (Rs)*
Kanda Lagwad (Marathi)	50/-
Pyaj Ki Kheti (Hindi)	50/-
Lasun Utpadan (Marathi)	25/-
Lasoon Utpadan (Hindi)	25/-
Kanda Bijjotpadan (Marathi)	35/-
Pyaj Ka Bijjotpadan (Hindi)	30/-
Kanda va Lasun Sathwan (Marathi)	30/-
Pyaj Avam Lahsun Bhandaran (Hindi)	30/-
Kanda Pratwari Yantra (Marathi)	5/-
Krishi Chaynika (Hindi) Special issue on onion and garlic	15/-
Onion Grader	5/-
CD Post Harvest Management of Onion and Garlic	50/-
CD Integrated Pest Management in Onion and Garlic	50/-
CD Kharif Onion PRoduction	50/-

*Postal charges extra - Rs. 20 for one book and Rs. 40 for above one book

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
- Storage of onion and garlic
- Marketing and trade of onion and garlic

For further information contact Director, NRCOG.



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