NRCOG NEWS

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सर्व शिक्षा अभियान
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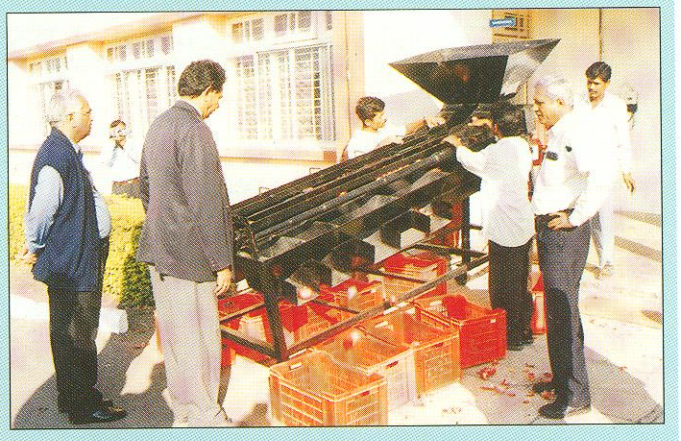
DG and DDG visit NRCOG

Dr. Mangala Rai, Secretary, DARE & Director General, ICAR, Dr. G. Kalloo, Deputy Director General (Horticulture & Crop Sci.)

accompanied by Dr. S. N. Puri, Vice-chancellor, Mahatma Phule Krishi Vidyapeeth, Rahuri visited the centre on 31/12/2003. Dr. K. E. Lawande, Director, NRCOG explained various research activities currently going on at the National Centre. They visited new laboratory cum administrative building complex and appreciated facilities developed at the centre. Dr. Rai and Dr. Kalloo discussed on going research programme and stressed upon to establish a gene pool complex to maintain wild and local germplasm especially light red, red and white onion collected by the centre. The dignitaries visited post harvest onion and garlic storage complex and showed keen interest in various small and medium storage structures. They critically examined the newly developed



onion grader by the Centre. Dr. Rai emphasized on the low cost storage structure, so that small and marginal farmers can store their produce with minimum loss and fetch a better price. He further stressed on organically grown onion and garlic to catch the domestic and export potential. He advised to acquire a separate piece of land for seed production, to maintain required isolation and the purity of varieties. He felt the immediate need for a Pathologist, Biochemist and Physiologist to bring in much needed impetus in improvement research. Before leaving they conveyed good wishes to all the members of the staff on the eve of New Year.

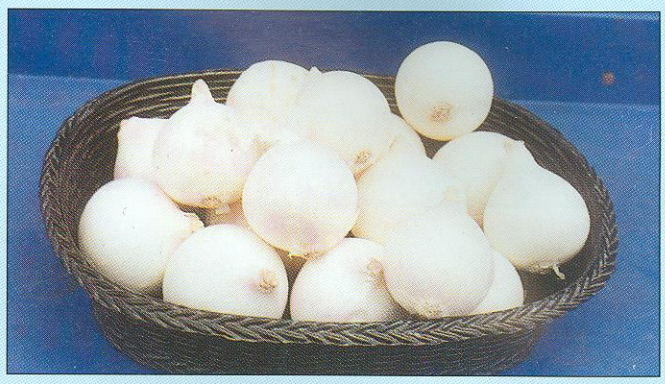
Breeding white onions for processing

Although processing of white onions has multifold benefits, availability of varieties with high soluble solids (18%) is the main constraint. Besides this, year round availability of white onion is another one. Keeping in view the above facts, the work has been initiated at this research centre for improvement of white onion. About 450 white onion germplasm lines

were collected from white onion growing areas of Maharashtra, Madhya Pradesh and Gujarat covering 25 districts and 208 villages.

Collected germplasm is being evaluated for their suitability in *kharif*, late *kharif* and *rabi* season for higher yield, total soluble solids (TSS), resistance to thrips and storage ability. Initially all the bulbs in the collected germplasm have been screened for TSS, but as such no germplasm had recorded average TSS above 17%. Out of 7199 bulbs from all germplasm only 2.76% individual bulbs recorded TSS above 14% and 0.43% individual bulbs recorded TSS above 17%.

The individual bulbs with high TSS were selected and multiplied separately under isolation and 85 bulb to row progenies were evaluated for TSS. The results were encouraging and more than 30 to 50% bulbs were obtained in most of the progenies had TSS above 17%. This indicates that there is good scope for the development of high TSS onion varieties.

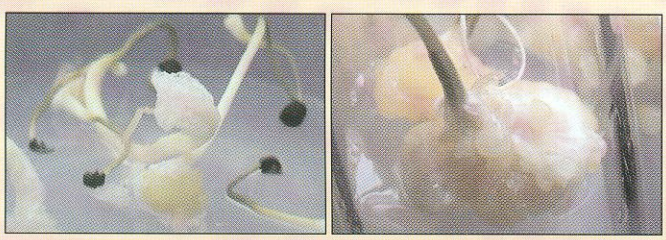


A promising line of White Onion

On the basis of total yield, promising lines with significantly higher yields than check variety Phule safed have been identified for different seasons. This will enable the availability of white onion through out the year. Further evaluation is in progress following suitable breeding approaches at this centre.

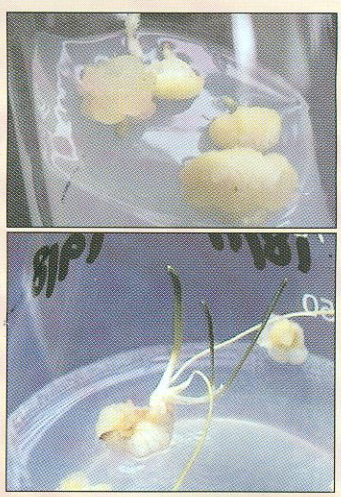
Biotechnology in Onion and Garlic

Onion and garlic are the most important *Alliaceaeous* vegetable crops grown throughout the world for its cuisinal and medicinal values. Although these crops assume major significance in India, both in terms of consumption and export, research work on biotechnological aspects is lacking. We, at this centre have initiated some programmes on onion and garlic tissue culture. The first and foremost area, for any future exploitation of biotechnological tools, is the development and standardization of an efficient in *vitro* regeneration protocol in the concerned crops. In this direction a project "Protocol Standardization in Onion (*Allium cepa* L.) and Garlic (*Allium sativum* L.)" has been initiated to standardize procedures for callus induction and regeneration; to develop efficient explants; to study the effect of different genotypes and reproducible protocols for micro-propagation from suitable media for callus culture and regeneration; and to transfer and evaluate the regenerated



[a] *[b]*

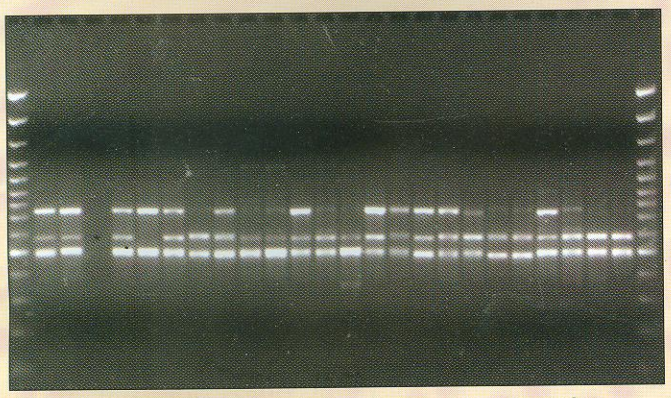
Callus formation from [a] seed explant, [b] shoot tip



[d] ***Callus formation from root tip of garlic,***
[e] ***callus regeration***

[c] ***Callus regeneration in onion***

plantlets for morphological characters in the field conditions. In this respect an initial success has been achieved for callus induction in onion from seed and shoot tip explants and in garlic from root tip and basal plate explants. In addition to this, multiple shoot induction from shoot tip in onion and stem disc explant in garlic



Primer OPA 2 showing polymorphism in onion

has also been achieved. These programmes will lay foundation for our future research on "Development of somaclonal variants in garlic" and " Haploid production in onion".

This centre has been identified as a National Active Germplasm Site for onion and garlic. Maintenance of germplasm is a laborious, time consuming and expensive operation. In order to avoid duplicity of the material and to characterize the germplasm biodiversity, genetic fingerprinting has achieved a great significance in recent years. In this

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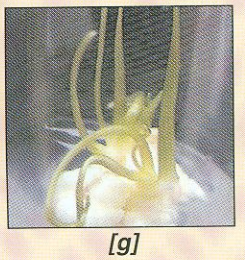


[g]

Multiple Shoot formation in [f] Onion and [g] Garlic

direction, a project on "DNA finger printing on onion and garlic varieties and germplasm" has also been initiated. Till now, DNA has been isolated from onion accessions and work on studying the primers suitable for polymorphism is on. 100 primers (Operon) have been used to study polymorphism and 35 primers were found suitable for detecting polymorphism. Work is going on to fingerprint the onion accessions with the identified primers for repeatability.

The future emphasis will be to fingerprint all the accessions in the gene bank so as to characterize and catalogue them along with their morphological characters.

Direct seeding in Onion-a prospect for higher yield

Onion is grown as direct sown crop all over the world except in few south Asian countries including India. The direct sowing of crop is beneficial under Indian conditions to overcome the problem of low productivity in *kharif* onions. It eliminates the problems associated with nursery rising during summer such as non-availability of irrigation water and seeds for early sowing *etc.* Keeping these points in view, experiment was conducted in *kharif* season during the year 2002, on direct sowing of onion in BBF under drip irrigation.

The preliminary results revealed that the sowing of seeds in July was found better than onions transplanted at the same time. The yield in direct sown onion was around 30 t/ha, which was almost double that of transplanted onions (16 t/ha). The total duration taken from seed to bulb was five months, which apparently seems higher than transplanted onions (three and half months). But when the duration in nursery is considered in transplanted crop, the total crop duration exceeds by 15 days than direct sown crop. The quality of onions produced in direct

sown onion was better than transplanted onions. There was more percentage of A and B grade bulbs in direct sown crop. Further the maturity of direct sown crop does not coincide with the torrential rains of October and thus there is saving in post harvest losses. As far as economics are concerned, it is profitable to go for direct seeding than for transplanting. But there are certain shortcomings in adoption of direct sown crop. First, the sowing of seed at optimum spacing is a major problem. Second, manual sowing in lines is time consuming, while broadcasting leads to poor germination and insufficient plant density. Therefore there is a need for development of indigenous precision planter for onion. Third, weed control in direct sown onion. At present, there are no recommended weedicides for direct sown crop. The recommended pre emergence weedicides such as Goal, Basalin and Stomp do not suit for direct sown crop. To harness benefits of direct seeding, these problems need to be tackled. NRCOG has initiated a programme for development of precision planter and weed management in direct sown onion.

Sulphate of Potash (K_2SO_4) excels Muriate of Potash (KCl) in yield and storability of Onion and Garlic

MOP-Muriate of potash (KCl) is a commonly used potassium fertilizer in most of the crops. In the present study, SOP- sulphate of potash (K_2SO_4), a sulphur containing potassium fertilizer was used to investigate its effect on sulphur loving crops like onion and garlic. The difference between potassium sources SOP and MOP and their levels was studied on the bulb yield and storage losses of onion (variety N2-4-1) and garlic (variety G-41), grown in *rabi* season during the years 2000 and 2001. Pooled analysis of two years data showed that significantly highest yield of onion (51.0 t/ha) was recorded due to application of SOP @ 100kg K/ha. Further the above treatment increased yield by 16 % over MOP applied @ 100kg K/ha. The average yield of onion bulb due to MOP treatments (45 t/ha) was lower than that of SOP treatments (47 t/ha). The average storage losses of bulbs over a period of six months due MOP was 37%, while due to SOP was 30%. The highest yield of garlic (12 t/ha) was recorded due to application of SOP @ 100kg K/ha. This treatment was superior over all the other treatments. Though highest level of SOP improved the yield, the difference between the yield of garlic bulbs due SOP as a whole (10.43t/ha) was marginal in comparison to MOP treatments (9.96t/ha). Substantial reduction in storage losses of garlic bulbs, by weight, over a period of six months was recorded due to potassium application compared to no potash treatment. The minimum storage loss of 20% was noticed due to application of SOP @ 100kg K/ha. Incidentally sulphur uptake of onion and garlic is 40-50 Kg/ha. Sulphur has been depleted in the soils and even it has been identified as a deficient plant nutrient of the decade. Potassium along with sulphur enhances storage. Sulphate of potash therefore plays a significant role in onion and garlic production. Onion and garlic are more sensitive to chloride toxicity. MOP though appears cheap; it may enhance the problem of chloride toxicity to these crops.

Outbreak of *Stemphylium* leaf blight

Stemphylium leaf blight caused by *Stemphylium vesicarium* is a major disease of onion in India. The disease occurred in severe form during *rabi* season of 2003-04 and

spreading on both bulb and seed crop of onion. Monocropping of onion and garlic and unusual rise in temperature than the normal during this period might have created favourable conditions for development and spread of the disease on large scale. In India, this disease was first recorded in 1973. It can cause about 60% losses in seed yield.

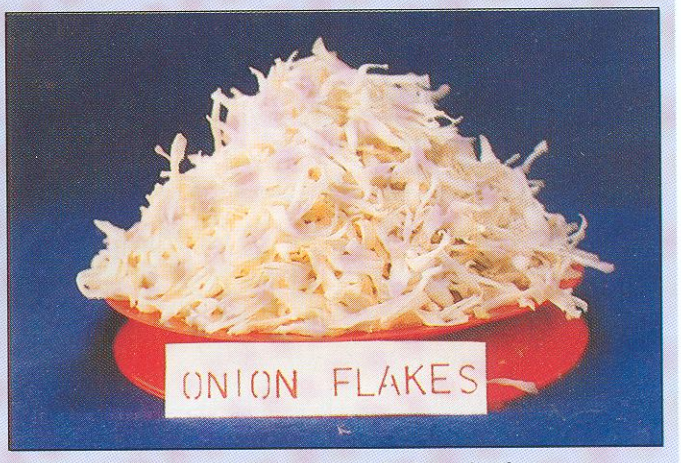
The symptoms appear at 3-4-leaf stage, only on the dorsal side of leaf / stalk. Small yellow to orange flecks or streaks appear on the middle of the leaf, which later elongate in to spindle shaped spots surrounded by characteristic pinkish margin. Lesions turn light brown to tan and blacken. In seed crop the flower stalk may break at the blight patches resulting complete seed loss. 3-4 sprays of 0.25% mancozeb, 0.25% chlorothalonil at 10 days interval is effective in controlling this disease.

From the Director's desk

Value addition for stabilization of prices in onion and garlic

Export and value addition in the form of processed products are the important factors for stabilizing prices in internal markets and thereby bringing sustainability in production of certain commodities. Onion and garlic offer great scope for value addition in the form of dehydrated flakes, rings, powder, granules, paste, oils, juice and salts. Onion pickles in brine is a novel product popular in European markets. Among all these products, dehydrated flakes and powder of onion and garlic are important from export point of view. Major export is made to Spain, Germany, U.K., Netherlands, France, Poland, Australia, Israel, Japan, *etc.* Recently, the demand for dehydrated onion products is increasing in USA and Australia. The estimated demand for onion dehydrated flakes and powder is to the tune of 10000 ton, however, the present processing units available in Gujarat and Maharashtra are meeting the demand up to 5000 ton only. The stringent conditions of processing with less human interference, utmost sanitation and best quality of product packed in attractive packages is the requirement of export market. Among the various processing units in India, Jain Food & Processing Industries is contributing major share in onion processing and meeting the quality of produce.

Almost all dehydration units are facing problems of continuous supply of white onion with high TSS at a reasonable price. The onion processing plants have to run exclusively for onion and no other commodities are processed in it, therefore, for running the unit in profit, it must be operated through out the year and therefore there is a need for year round supply of white onion. Onion production in India is basically dominated by red onion, and white onion is a rare commodity in the markets.



Value addition through dehydration

Unless, otherwise, contract farming is not established by way of developing proper relations between processing units and farmers, the industries cannot run. In recent years, Jain Food & Processing Industries have developed a good rapport with the farmers for producing white onion exclusively for processing on contract production basis. Further, the units are also facing problems of availability of