

From the director's desk

The period under report witnessed heavy rainfall almost double the average of this region. This has resulted in high incidence of diseases especially *Colletotrichum* on kharif onion. Elongation of neck and pale yellow dangling leaves are the significant symptoms associated with this disease. Affected plants do not form good bulbs. Continuous rains and improper drainage favours the disease the most. Failure of kharif crop due to such adversities always leads to price hike from December - February, till late kharif produce enters the market. Kharif crop plays very crucial role in bridging the supply gap from November- February after the exhaust of stored rabi onion which is available from April- November. After assessing the importance of kharif crop, we have launched a programme for enhancing the productivity of onion in this particular season. Planting seedlings on BBF with drip irrigation facilitates quick and good drainage of rainwater. The root zone always remains on a mound, which has proper mixture of air, and water that facilitates good bulb development. Application of organic manures along with *Trichoderma viride* helps in checking the infections of fungi causing root and neck rot. This technology has been verified at our farms for last four years. There is assurance of yield to the tune of 20t/ha even with 1300mm rainfall as against 3-4 t/ha yield with conventional practice of transplanting on flat beds by the farmers. For effective dissemination of the technologies generated, the Centre also developed AV aids in the form of CD in Hindi, Marathi and English on kharif onion production technology and integrated pest and disease management, which are available to the farmers.



Research Highlights

Somatic embryogenesis in garlic

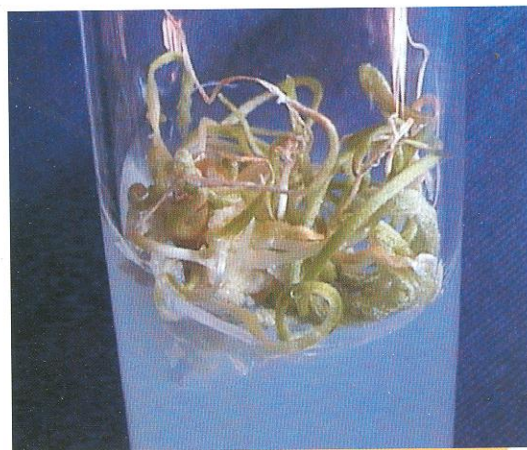


Complete plantlets of Acc. No. 38 in 2,4-D raised callus in phytagel upon transfer to agar

Garlic being a sterile crop, is propagated vegetatively, thereby making introgression of genes of interest practically impossible through conventional breeding methods. Somatic embryogenesis is an initial step towards development of transgenics with desirable characters. Seven different garlic lines were tried initially for embryogenesis. Embryogenic calli were obtained in 2,4-D containing MS medium augmented with agar agar or phytagel. It was noted that Acc. No. 38, a promising line of garlic developed at NRCOG showed embryogenesis as well as organogenesis in 2,4-D containing medium gelled with phytagel initially and later transferred to the same medium gelled with agar agar. Healthy plantlets and shoots were formed and these later formed in vitro bulbils in basal MS medium with 6% sucrose.

Shoot multiplication protocol for CMS lines in onion

Onion being a highly cross-pollinated crop shows a high degree of heterozygosity in the population. Moreover, due to inbreeding depression and biennial nature of the crop, development of inbred lines for heterosis breeding is very difficult and time consuming. For speeding up the development of hybrids, CMS lines play a very important role. We have standardized an *in vitro* multiplication protocol for the CMS lines MS 65 A and B as well as MS 48 A and B using axenic shoot tip explant. Though genotypic difference was observed, multiplication was obtained. Maximum multiple shoots (20-25 shoots) was obtained in MS 65 A in MS medium fortified with TDZ and NAA followed by MS 48 A inducing a maximum of 12-15 shoots in medium containing 2iP. Both the B lines were relatively inferior giving rise to 3-7 and 5-10 shoots, respectively.



MS 65 A showing 20-25 shoots in TDZ (1 mg/l) + NAA (0.5 mg/l) containing shoot multiplication media

Meristem tip culture in garlic



Multiple shoot induction in G-323



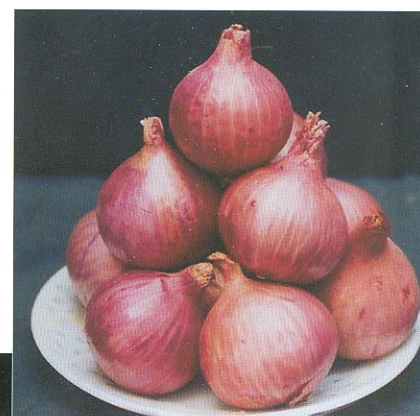
Meristem tip

Garlic being vegetatively propagated, is a storehouse of different viruses. Meristem tip culture is a method whereby virus free cultures can be raised. Three different varieties, G-41, G-282 & G-323 were used. Meristem tips were isolated from cloves germinated *in vitro* (after 1 month) and directly from the cloves and were inoculated into culture initiation / multiplication media consisting of various combinations of TDZ (0.1-1 mg/l) and NAA (0.05-0.15 mg/l) alone and combinations of the same. All the varieties studied initiated multiple shoots from meristem tip in various combinations of TDZ alone and in combination with NAA. The shoots formed were subjected to *in vitro* bulblet induction and are stored for further ELISA testing.

Single centred onion varieties for *kharif* and late *kharif* seasons

Kharif onion plays a very crucial role in bridging the gap in supply in the country from October-January. Similarly *late kharif* crop is becoming popular for its high yield, good quality and suitability to export right from February onwards. The existing varieties viz, N-53, Arka Kalyan, Agrifound Dark Red and Baswant-780 suffer from drawbacks such as multi-centers, more double bulbs, bolting, variation in colour and shape and adaptability to both the seasons.

Considering these points, NRCOG started breeding work since 1998 and developed Super-780 and B-780-5-3-1 advanced lines, which are suitable for both the seasons. Besides, their adaptability for different seasons, there is high percentage of single centered bulbs (>90%) in these lines against varieties in vogue (20%). Further, bulb shape and colour uniformity is very high. Bulbs are dark red with globose shape. Yield-wise, both lines are superior to N-53, ADR and Arka Kalyan and also mother population of Baswant-780.



SUPER-780



B-780-5-3-1

Induction of Manganese deficiency in calcareous soil due to intense rain

Manganese deficiency was observed in patches in onion crop due to heavy rainfall in well-drained calcareous soil having free CaCO_3 nodules in the surface layer. The symptoms were noticed on 50-day-old late *kharif* crop after intense rain of 64mm on 13 August and 24.8 mm on 14 August. Intense rains resulted in leaching of micronutrients. At the same time, Ca^{2+} and CO_3^{2-} ions released from free calcium carbonate nodules raised the soil pH towards alkalinity around 8.7 in the root zone. This sudden increase in soil pH in root zone had blocked the uptake of Mn. The deficiency was manifested in young leaves, because the mobility of Mn^{2+} ions from older leaves to younger leaves was low. Due to non-availability of Mn for chlorophyll development, the emerging young leaves turned yellow or white. Similar pale coloured rings were also noticed on the inner second whorl of leaves as the Mn^{2+} ions might have moved within the leaf towards growing tip *i.e.* leaf elongation. The deficient leaves had manganese concentration $< 6\text{ppm}$ while, the healthy green leaves contained $> 15\text{ppm}$ of Mn.

All the plants recovered after foliar application of MnSO_4 within 10 days. Whereas, the plants took 20-25 days to recover from yellowness in plots where Mn was not applied. Newly emerged young leaves were without yellow patches. This could be due to fading of massing effect of free carbonates from nodules in root zone that raise the soil pH. Hence, deficiency of Manganese in root zone is mainly governed by soil pH.



Manganese Deficiency



Recovery after foliar spray of Mn

Mulching for effective weed control in onion and garlic

Mulching is one of the important practices in weed control followed in most of the commercial vegetable crops. It is very efficient, socially acceptable and eco friendly in nature. Mulches can either be organic or inorganic. Beside weed control, mulches conserve soil moisture, prevent soil erosion, maintain the soil temperature and increase the crop yield. Keeping this in view, a preliminary trial was conducted in onion and garlic bulb crops to study the effect of different mulching materials on weed control, growth and yield. In this experiment, the organic mulches viz., paddy straw, soybean husk, bajra husk and saw dust and inorganic mulches like transparent polythene, black polythene and bicolor polythene sheets were evaluated. The varieties N-2-4-1 (onion) and G-41 (garlic) were raised on drip irrigation beds.

In onion, paddy straw mulch was found superior in terms of higher marketable bulb yield (43.26t/ha) than other mulches tried. The increase in yield may be due to favourable soil moisture and optimum soil temperature during bulb formation period. Where



as, the highest weed control efficiency of 90.4% was noticed in black polythene mulch. This may be due to penetration of more sunlight and the increase in soil temperature. In case of garlic, saw dust mulch was found to be superior in terms of higher marketable bulb yield (12.3 t/ha). The minimum number of weeds (3.2 /m²) and the highest weed control efficiency (87.0%) was noticed in black polythene mulch treatment.

Transfer of Technology

Farmers training

Farmers training programme on "Improved Production technology on Onion and Garlic" was held for 3 days i.e. 13-15 November at the center in collaboration with NABARD, Pune. Around 21 farmers from Maharashtra participated in the training. The farmers were enlightened with the various aspects of onion and garlic production through lectures followed by field and market visits.

In collaboration with NHRDF, Nasik one-day training programme on "Microirrigation technology for production of onion and garlic" was organised on 16.11.06 at the centre. 25 farmers from Maharashtra participated in the training programme.

Agriculture Exhibition

NRCOG has participated in the Agricultural Exhibition 'Kisan-2006' during 13 - 17 December, 2006 at Moshi, Pune organized by Kisan Forum Pvt. Ltd., supported by Ministry of Agriculture, Government of India.

हिन्दी पखवाड़ा

इस केन्द्र में दिनांक 15.09.2006 से 28.09.2006 तक हिन्दी पखवाड़ा मनाया गया। इस दौरान हिन्दी में पत्र लेखन, वैज्ञानिक संभाषण, हिन्दी प्रश्न मंजूषा, हिन्दी पठन, हिन्दी शब्द ज्ञान सुलेखन, कविता पाठ, निबन्ध, वाद-विवाद एवं टंकण आदि प्रतियोगिताओं का आयोजन किया गया। हिन्दी पखवाड़ा का समापन समारोह दिनांक 28.09.2006 को मुख्य अतिथि डॉ. (श्रीमती) संतोष कालिया, प्राध्यापक, सर परशुराम भाऊ महाविद्यालय, पुणे के सानिध्य में सम्पन्न हुआ। इस अवसर पर प्रथम, द्वितीय एवं तृतीय स्थान प्राप्त करने वाले प्रतिभागियों को पुरस्कार प्रदान किये गये।

Our new colleagues



Dr. R.P. Singh

- ◆ Dr. R.P. Singh, joined as senior scientist (Plant Pathology) on 14.09.06
- ◆ Sh. Avinash R. Wakhare joined as T-3 (Field Asstt.) on 16.12.06
- ◆ Sh. Hemchandra S. Gawali joined as T-1 (Field/Farm Technician) on 12.12.06
- ◆ Sh. Satish Baban Tapkir joined as SSGr I on 01.12.06
- ◆ Sh. Amol Dilip Fulsundar joined as SSGr I on 13.12.06

Distinguished Visitors

Dr. Krishna Lavhekar, Commissioner Agriculture, Pune	20/07/2006
Dr. A.S. Patil, Director (ARE), VSI, Pune	03/08/2006
Mr. Bhagwan Datar, News Editor, Loksatta, Pune	16/12/2006
Dr. K.V. Peter, Ex-VC, KAU, Kerala	29/12/2006
Dr. Shyam Singh, Director, NRC Citrus, Nagpur	30/12/2006
Dr. J.H. Kulkarni, VC, UAS, Dharwad	31/12/2006



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