NRCOG NEWS

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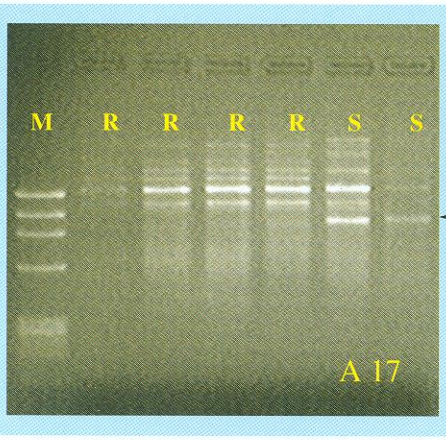
From the Director's Desk

Rabi season of 2004-05 experienced good yield of onion and garlic almost all over the country. The prices got stabilized fairly due to substantial onion export since December. Large numbers of storage structures are being constructed in Maharashtra following the successful demonstration of scientifically built storage structures and financial support extended by department of agriculture. This has increased onion storage capacity to the tune of 5 lakh tons in Maharashtra. The center has designed and modified the storage structures with controlled ventilation suitable for humid regions and needs testing in strategic areas. Recommendations on micro-irrigation through drip and sprinkler are gaining popularity among the farmers on account of water saving (35-40%), yield increase (10-15%) and convenience of irrigation. Reduction in size of bulb has been experienced these days. Lack of sufficient organic matter, deficiency of sulfur, zinc, boron and iron affect the bulb size cumulatively. This centre has planned and conducting research trials on INM and fertigation. Basic studies on hunger signs in onion and garlic are at the verge of completion. Besides purple blotch and Stemphylium blight, incidence of Iris Yellow Spot Virus was noticed in many areas on orion seed crop. This tospo virus makes the flower stalk or scape to collapse before the seed maturity, resulting in heavy losses in seed yield. In the absence of resistant varieties, vector (thrips) control is the most reliable alternative. Various IPM modules that comprise cultural practices, biopesticides and minimum chemical intervention in a compatible manner are being evaluated at the centre. Biotechnological approaches for quality improvement and imparting disease resistance are being tackled.

Identification of mite resistant garlic lines using RAPD markers

Eriophyid mite, *Aceria tulipae* is a pest of garlic. The infested plants curl and show mottling. As a result bulb size gets reduced considerably. Through screening garlic germplasm, 42 lines were identified resistant to this mite. In order to validate the results at molecular level as well as to identify the markers linked to eriophyid mite resistance, work was initiated to fingerprint the genotypes using RAPD markers.

DNA from resistant as well as susceptible accessions was isolated and quantified using lambda DNA on 1% agarose gel. A total of 100 RAPD markers were tried to identify polymorphism in resistant and susceptible genotypes. In the initial screening, 40 primers showed polymorphism. After further screening, 27 primers were found to distinguish between resistant and susceptible lines. Further evaluation of these primers led to identification of 7 primers, which gave clear distinction between the resistant and susceptible accessions.

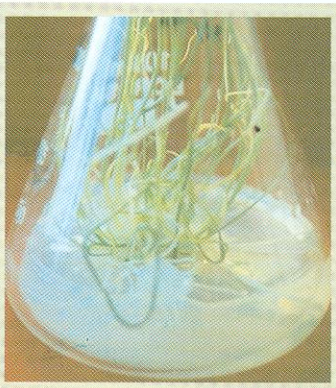


Primer OPA 17 showing polymorphism between the resistant (R) and susceptible lines (S). Note the band present in susceptible lines (shown by arrow head) and absent in resistant lines.

M = ϕ X174 DNA Hae III Digest Molecular ladder

A Cultivar independent protocol for garlic shoot multiplication

A simple protocol for *in vitro* shoot multiplication of ten accessions including eight varieties and two advanced lines of short day Indian garlic representing wide genetic variability has been developed. Basal plate from mature cloves was used as explant for multiple shoot induction. Although, genetic variability was found to exist among the genotypes, acceptable values of shoot multiplication were obtained in all the accessions in MS2 (MS medium fortified with 2iP) along with almost 100% bulb formation in the shoots produced. Amongst the ten lines tested, G-41 was found to be significantly superior by producing 16-20 shoots after 90 days of culture. Variability was also observed in the *in vitro* bulbils produced with most of the bulbils showing a purple colour.



Variety G – 41 showing the induction

Drip-fertigation increases water and fertilizer use efficiency

In recent years, greater importance has been given to input use efficiency. Drip fertigation is one such method to increase the efficiency of irrigation water and nutrients in onion and garlic. In drip system, water and nutrients are supplied at the root zone of the crop with the help of emitters and a network of pipes that ensures supply of water and nutrients at right time in required quantity. Field trials were conducted during the years 2002-2005, to find out optimum nutrient requirement of onion and garlic through drip fertigation. The results revealed that water-soluble fertilizers through drip irrigation improved the yield and yield contributing characters in both the crops. The percentage of A- grade bulbs were more in 100% of recommended dose of fertilizers as water soluble through drip than broadcasting method. The reduction in fertilizer dose significantly reduced the marketable bulb yield of onion and garlic. When fertilizer dose increased from 60-100 per cent, the value of additional yield was less than the additional cost of fertilizer incurred. In onion the dose, NPK 50:50:50 kg/ha as basal +100 kg N in seven splits through drip irrigation gave higher income per unit area whereas in garlic the treatment NPK 50:50:50 kg/ha as basal + 50kg N in seven splits through drip irrigation gave higher income per unit area. In conclusion, NPK 50:50:50 kg/ha as basal +100 kg N in seven splits through drip irrigation adjudged the best treatment in terms of yield and cost - benefit ratio. As far as water saving is concerned, there was 30-40% saving of water in drip fertigation over surface irrigation.

Secondary and micronutrient deficiency symptoms in onion

A sand culture study was conducted to identify nutrient deficiency symptoms in onion crop using Hoagland's nutrient solution. The visual symptoms for the secondary nutrient Magnesium and micronutrients viz., Iron, Zinc and copper are shown here under.

Magnesium

- Pale lesion at the tip of leaves
- Drying of leaves from the tips

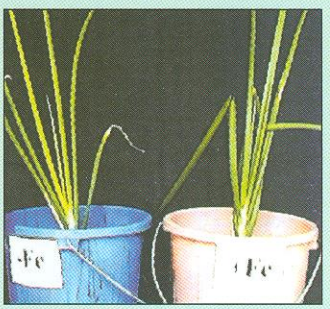
Zinc

- Elongated and twisted growth of leaves
- Yellowing of old leaves

Copper

- Complete drying of leaves with brown tips
- Appearance of die-back symptoms

Iron



- Young leaves appear pale green

Iris Yellow Spot Virus knocking the door of Indian onion seed industry

Iris Yellow Spot Virus (IYSV), a relatively new tospo virus was noticed on onion crop grown for seed and bulb. The virus is primarily transmitted by *Thrips tabaci* (Thysanoptera: Thripidae). But thrips can transmit the virus only if they acquire during larval stage, especially by the first instar. Thrips remain viruliferous for the entire life but the virus is not known to pass to next progeny through eggs.

The disease causes straw coloured, dry, spindle or diamond shaped lesions with green centers on the leaves and scapes or seed stalks of onion. These symptoms are more distinct on seed stalk than on foliage. In case of severe infestation, the stalks break and fall down resulting in total seed loss. IYSV is not known to have any direct effect on bulb quality but bulbs may not develop fully and store poorly. In bulb crop, the lesions reduce the photosynthetic area and reduce the bulb size. The total yield losses of 1-10% or more reported in Colorado, USA. This virus is not transmitted to onion seedlings from infected mother plants through the seed.

Recently the disease was noticed on *rabi* grown onion at NRCOG, Rajgurunagar and near by areas. It occurred more severe on seed crop and 100% incidence was noticed. The leaves were dried completely and more than 80% stalks were found broken at lesion. Symptoms were also noticed on bulb onion and garlic crops. The disease was identified with IYSV serologically through DAS ELISA. However, further confirmation with regard to strain, needs to be studied through RT PCR.

Onion Yellow Dwarf Virus, a poty virus was also detected on the seed crop. It was confirmed through ISEM.