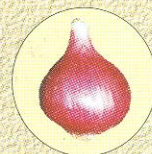


ONION-GARLIC



A biannual publication by National Research Centre for Onion and Garlic

NEWS

FROM THE DIRECTOR'S DESK

Onion Storage - need of the day for steady availability and stability of prices

There is hardly any Indian cuisine, which can be prepared without onion. Requirement of onion is daily while production and its availability in Indian markets is mainly during Oct-Nov., Jan-Feb. and April-May. Onion is a perishable commodity. However looking to its daily requirement and season bound availability, storage becomes imperative. Kharif onion produce is first available for consumption from Oct to Nov., which accounts for 20 per cent. This produce suffices need up to Jan.-Feb. Second crop of late kharif (Rangda) is available in Jan-Feb., which accounts for 30 per cent while main crop (winter- summer) is available in April-May that accounts for 50 per cent. Due to overlapping production from Jan-May prices lower down. Farmers are required to store bulbs up to Oct-Nov. till next crop comes in the market in a wait for increase in market prices. During the period of 5-6 months storage there are colossal three fold losses viz., weight loss (20-30%) from April-June, rotting loss (10-20%) and sprouting loss (10-20%) from July to Nov. Storage is a function of genotype, cultural

practices and storage environment. Augmentation of storage environment can reduce storage losses from 50 to 20 per cent.

Country needs storage facilities to the tune of 5 - 6 lakh tons. Do we have facilities for holding such a huge stock? The sample survey made by NRCOG in Maharashtra revealed that only 30 per cent onion is stored in permanent storage structures while remaining in temporary and semi-permanent storage structures, which aggravate the problem of losses. Among permanent, only 39 per cent are with bottom ventilation. Designing and erection of bottom ventilated storage structures with various capacities suitable for small and marginal farmers, big farmers, traders, APMC authorities is essential. The agencies like NABARD, NHB, NHRDF, APMCs of different states have geared up their machinery for advancing financial assistance to end users. For providing technical assistance, NRCOG is experimenting on various storage structures ranging from low cost to high cost, 5 tons to 50 tons capacity and other aspects related to storage. The centre is also exploring the possibility of storing onion in cold storage and checking post cold storage sprouting of onion by using irradiation technology in collaboration with BARC, Mumbai.

RESEARCH HIGHLIGHTS

Crop Improvement

Evaluation of onion germplasm

- * During rangda season 104 lines of red onion were evaluated for yield. None was found superior to check.
- * Among eleven elite lines of red onion, selected on the basis of storability and TSS, acc.No. 597(46.9 t/ha) and 592(42.3 t/ha) performed significantly superior over all checks and were at par with B-780 (49.1 t/ha).
- * Five advanced lines of red onion were evaluated during rangda season. Significantly higher marketable yields were recorded in B-780-5-3-1 (R), B-780-5-3-1 (LR), B-780-5-2-1 & B-780-5-2-2 ranging between 53.07 to 61.07 t/ha over B-780 & N-2-4-1 (49.96t/ha)
- * Out of twenty-six exotic hybrids evaluated, Cadillac (65 t/ha), HY-3667 (66.6 t/ha), HY-9539 (72.8 t/ha), HY-3404 (78.1 t/ha) and Cyclone (86.5 t/ha) recorded significantly higher yield over all the check varieties. Sixteen hybrids were found to be significantly superior over the Indian hybrid Arka Lalima.
- * Fifty-three entries of white onions were evaluated during rangda season. Four entries W-417, W-422, W-429, W-431 recorded significantly higher marketable yields ranged between 25.6 to 30.14 t/ha over check variety Phule Safed (20.4 t/ha). Bolting is associated with rangda season and 10 entries recorded no bolters in white onion germplasm.
- * Fifty-one entries of white onion were evaluated during rabi where eight entries viz: W-404, W-415, W-418, W-433, W-438, W-439, W-440 & W-441 recorded significantly higher marketable yields over Phule Safed (37.18 t/ha). Percentage of doubles was less than 5% in nine entries.
- * Exotic long day onions were forced to flower and seed was produced which will be evaluated and used in crossing programme.

Evaluation of new F1 hybrids

F1 hybrids of onion were developed using male sterile lines. 12 F1 hybrids found promising with more than 44 per cent superiority over better parent. And 8 hybrids found significantly superior over the check, N-2-4-1.

Evaluation of garlic Germplasm

In garlic, out of 135 lines evaluated 81 lines were found to be at par with GG-3; 75 with GG-2 and 4 lines with G-41. Acc. No. 336 was statistically superior to GG-2, whereas, Acc. No. 336 and 345 was superior over GG-3 in terms of marketable yield.

Amongst the different elite lines screened, Acc. No. 74 and 200 were superior over check, GG-3 with regards to marketable yield. 35 lines were at par with GG-3; 27 with GG-2 and 3 lines (Acc. No. 74, 200 and 221) with G-41.

CROP PRODUCTION

NRCOG develops Onion Grader



NRC Onion & Garlic developed roller type onion grader. This has a capacity of 0.5 t /h/labour as compared to 0.1 t/h/labour in manual grading. It grades onion in five different grades (< 35, 35-50, 50-60, 60-80 and > 80 mm) according to the size of the bulbs. It is manually operated but can be motorized. The grader has total weight of 50 Kg and can easily be taken to fields. The grader has 10 times higher precision than manual grading.

Micro-irrigation for onion and garlic

Flood or surface irrigation method is widely practiced in India that results in inefficient use of irrigation water due to losses in evaporation, percolation and distribution; while water use efficiency of properly designed and managed micro irrigation system is about 90 percent. Attempts have been made to use micro irrigation system for onion and garlic.

Among the different methods and levels of irrigation, drip irrigation at 100% PE recorded the highest yield in both the crops (Onion - 43.5t/ha and garlic-14.5t/ha). The yield increase over surface irrigation was 11.5% in onion and 1.58% in garlic. The percentage of 'A' grade bulbs was higher in drip system in both the crops. The increased yield in drip irrigation system was mostly due to the plants which were always subjected to field capacity leading to proper proportion and distribution of water and air in the root zone. In drip irrigation at 100% PE the water saving was 56.3% in onion and 55.5% in garlic over surface irrigation.

Bigger mother cloves for higher yield of garlic

The productivity of garlic is very low in our country compared to China and other garlic producing countries. The low productivity is mainly due to use of old varieties, poor quality material, traditional cultivation practices and short growing season. Use of bigger cloves help in increasing yield. Based on the three years experiment, mother clove size of 1.4 to 1.6g recorded the highest marketable bulb yield of 12.8 t/ha followed by 0.8 to 1.0g mother cloves (10.3 t/ha). The increased yield is due to good field establishment, number of bigger bulbs with bigger cloves.

Seed pelleting increases onion yield

Seed pelleting offers scope to improve germination, vigour and controlling microenvironment in which seed germinates. Pelleting regulates the size of seeds for precision planting by man/machine and reduces the quantity

of seeds required for planting and eliminates thinning operation. During *kharif*, the highest marketable yield (30.1t/ha) was obtained with a treatment combination of DAP 3 g/kg + Borax 0.1 g/kg + Bavistin 3 g/kg of seed under raised bed system. In *rabi* season also, the same treatment proved the best with respect to germination percent and marketable bulb yield (31.4t/ha) under flat bed system.

Organic manures reduces load on fertilizers in garlic

Combined application of organic manures and the chemical fertilizers can help in improving the nutrient uptake and mitigate the losses of plant nutrients in the soil. Combined application of recommended dose of organic manures (FYM 25 t /ha) and fertilizers recorded the highest bulb yield in garlic (9.83 t /ha) under drip irrigation which was on par with combined application of 50 % of FYM (12.5 t/ha) + Vermi -compost (4t/ha) + 50% of recommended dose of NPK fertilizers with a yield of 9.32 t/ha. These results infer that there is scope for management of garlic with lower rates of manures and fertilizers to get the same yields.

Herbicides for onion seed crop

In onion seed crop manual weeding after development of umbel often leads to breaking of flower stalks resulting in reduction of seed yield so also unweeded fields. Supplementary chemical weeding at 45-60 days after planting can augment the situation. The preliminary studies on weed management in onion seed crop revealed that weed free environment through hand weeding when ever required recorded the highest seed yield of 4.63 t/ha which was on par with one spray of Goal ATP + second spray at 45 DAP recorded the seed yield of 4.52 t/ha.

Plant nutrients effects storability of onion and garlic

Storage losses of Onion and Garlic bulbs increased with increase in the rates of NPK

application. Soil application of different rates of potassium fertilizers with and without sulphur (SoP & MoP) were tried to know the effect on the keeping quality of bulbs stored for six months. Application of SoP recorded 10 % less loss compared to MoP application in case of onion and only 5 % in garlic. Application of vermicompost @ 4t/ha recorded 15 % less storage losses in onion compared to 100 % RDF application. Micronutrients viz., Fe, Mn, Cu and Zn had no effect on storability of onion and garlic.

Sulphur improves yield and quality of Onion and Garlic

Onion and garlic are sulfur loving crops and its application is often neglected in nutrient management of these crops. Application of 67.5 kg/ha sulphur along with NPK (100 % RDF) to soil low in sulphur produced 11.8 % more onion bulb yield than only NPK application. In case of garlic highest bulb yield of 14.38 t/ha was noticed with 45 Kg sulphur application. Pyruvic acid plays a major role in onion pungency. Pyruvic acid concentration increased from 3.50 $\mu\text{mol/ml}$ (no sulphur) to 4.8 $\mu\text{mol/ml}$ due to application of 67.5 kg sulphur.

CROP PROTECTION

Helicoverpa attack on onion seed crop



Gram caterpillar, *H. armigera* attacked onion seed crop during *rabi* season. Infestation was noticed on plants grown under cages but not in the open fields. Larvae make holes on the flower stalk, feed inside and move upwards to reach the base of

the umbel at early stages of flowering. Subsequently it invades the umbel and feeds on seeds. As a result complete drying of flowers and complete loss of seed occurs.

Barrier cropping -a new method for thrips management in onion



Blocking the adult thrips to reach onion crop may be greatly helpful in reducing the initial pest load and subsequent multiplication of the pest. Barrier cropping with two rows of maize (2M), one outer row of maize + one inner row of wheat (MW) blocked adult thrips up to 80% compared to no barrier crop. The lowest number of thrips was recorded in 2M and MW compared to crop where no barrier was present. Stemphylium blight was higher in 2M and MW plots compared to control. Further refinement in this method is underway.

Red spider mite on garlic and onion seed crop - a first time report



Red spider mite (species not identified) infested garlic and onion seed crop for the first time. On garlic, mite infestation occurred at maturity stage.

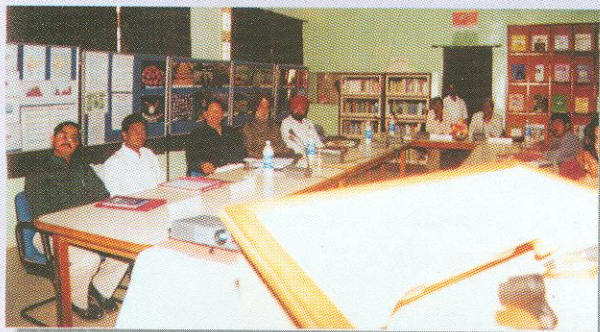
Mite incidence was noticed on onion, which was grown under cages but not in the open fields. Mites made webs on leaves in garlic whereas in onion profuse webbing was noticed on umbels, flower stalk and leaves. No specific symptoms other than webbing were observed in both the cases.

New thrips species on onion

Apart from *T. tabaci* a new species was recorded on onion. This new species, which is to be identified, was trapped on yellow sticky traps and was black in colour. In temperate regions and other onion growing areas both *T. tabaci* and *Frankliniella* sp. occur on onion.

INSTITUTE MEETINGS

First QRT meeting of the centre was held from 4-9th February 2002 and the final meeting from 20-21st May 2002 at this centre under the chairmanship of Dr. M.R. Thakur, Ex-Vice-Chancellor, Dr. Y.S. Parmar University of Horticulture & Forestry, Solan. The member were Dr. H.S. Gill, Ex-Head, Division of



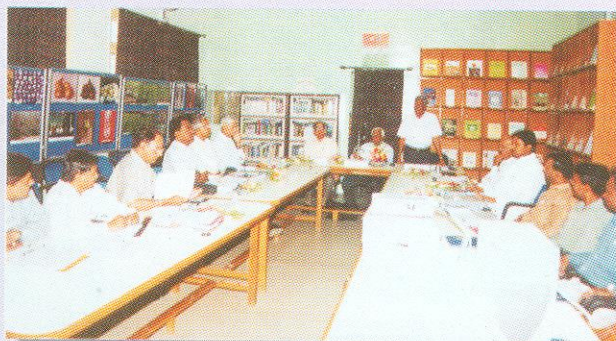
Vegetable Crops, IARI, New Delhi, Dr. Narendra Singh, Ex-Head, Division of Vegetable Crops, IARI, New Delhi, Dr. C.D. Mayee, Director, CICR, Nagpur, Dr. B.B. Lal Kaushal, Professor & Head, Dr. Y.S. Parmar University of Horticulture & Forestry, Solan and Dr. U.B. Pandey, Director, NHRDF, Nashik and Member Secretary, QRT. The team reviewed on-going work and expressed full satisfaction about the progress made by the centre and suggested measures for further strengthening of NRCOG.

Fifth SRC meeting was conducted on 12-14th June 2002 under chairmanship of Dr. K.E. Lawande, Director, NRCOG. Scientists presented progress of their work and future programme, which were thoroughly discussed. Fifth RAC meeting was held on 17th June 2002. Dr. Vishnu Swarup, Director, Indo-American Hybrid Seeds, New Delhi chaired the meeting. The members were Dr. B.S. Dhankhar, ADG (VC), ICAR, New Delhi, Dr. K.E. Lawande, Director, NRCOG, Rajgurunagar, Dr. O.P. Dutta, Ex-Head, Dept. of Vegetable Crops, IIHR, Bangalore, Dr. S.S. Kadam, Head, Dept. Of Biotechnology, MPKV, Rahuri, Dr. S.H. Shinde, Dean, College of Agriculture, Kolhapur, Dr. S.J. Singh, Head, IARI Regional Station, Pune, Prof. R.P. Singh, Nalanda (Bihar), Mr. Dhananjay Kumar, Patna and Dr. V. Mahajan, Sr. Scientist & Member Secretary. All the scientists presented their findings and the programmes were critically discussed. The committee appreciated the concerted efforts of the scientists and gave appropriate suggestions for future research programmes.

Fifth IMC meeting was held on 18th June 2002 under the chairmanship of Dr. K.E. Lawande, Director, NRCOG. The committee reviewed and approved the agenda items accordingly.

TRANSFER OF TECHNOLOGY

Farmers' day was organized in this center on 14 March 2002 in collaboration with IFFCO, Pune. Dr. S.N. Puri, Vice-Chancellor, MPKV, Rahuri was the Chief-guest on the occasion. More than 500 farmers actively participated. The director and the



scientists imparted knowledge on recent technology in onion and garlic production. Dr. J.P. Mahalle, Director of Horticulture, Govt. of Maharashtra, inaugurated the exhibition. The farmers updated their knowledge on agro-products, displayed by different agencies in the exhibition.

Three-day farmers training were organized for two batches of farmers at this centre on 19-21st and 26-29th March 2002 in collaboration with NHRDF, Nashik. About 100 farmers from Karnataka



and Madhya Pradesh were given training on improved varieties, production and protection technology and seed production of onion and garlic.

DISTINGUISHED VISITOR

Dr. M. Mahadevappa Chairman, ASRB, New Delhi visited the centre on 15 May 2002.

MEETINGS/WORKSHOPS

Dr. K.E. Lawande attended 'World Spice Congress 2002' at Cochin organised by AISEF and Spices Board of India, Cochin from 31 Jan to 2 Feb 2002.

National dialogue on 'Germplasm Management of

Horticulture & Agro forestry Crops' from 27 - 28 Feb, 2002 and acted as Panelist for session - IV organised by NBPGR, New Delhi.

National Seminar on 'Horticulture development in Chhatisgarh-Vision and Vikas' from 21- 23 Jan 2002 organised by IGAU, and Chhatisgarh Horticultural Society, Raipur and presented paper on 'Onion and Garlic Production- Potential and prospective in Chhatisgarh'.

Workshop organised by NCAP, New Delhi at IIVR, Varanasi from 1- 2 Mar 2002 and presented paper on "Impact of Vegetable Research in India"

Dr. V. Mahajan attended National Workshop on 'Plant Variety Protection' held on 28 Feb- 1 Mar 2002 at Pune, organized by Ministry of Agriculture.

Dr. V. Mahajan and V.Sankar participated in XX All India Coordinated Vegetable Group Meeting held on 9-11 April 2002 at KAU, Thrissur.

PUBLICATIONS

Sankar V., Qureshi A.A., Tripathi, P.C. and K.E. Lawande. Drip Irrigation in Garlic. Spice India. April Issue 2002.

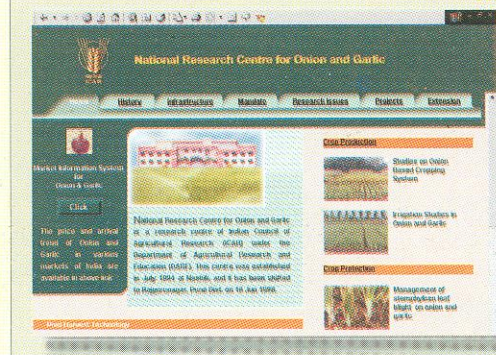
Tripathi P.C., Sankar, V. and K.E. Lawande. Agrifound Parvati - A high yielding garlic variety for hills. Spice India. May Issue. 2002.

Lawande, K.E., Vijay Mahajan and P. Kulkarni. Kanda niryat va prakriya. Shetkari, Jan-Feb 2002, 11-15.

Lawande, K.E., Vijay Mahajan, S.B. Kadam and S.S. Dhumal. Kandhyache sudharit padhatine sathwanuk. Shetkari, April 2002, 17

Website Launched

<http://nrcog.mah.nic.in>



The web site of NRCOG was launched on 14 March 2002 by Dr. S.N. Puri, Vice-Chancellor, MPKV, Rahuri. The website designed and developed in-house also optimized for quicker down loads. The site provides information regarding origination, mandate, research projects and Extension activities of the centre. The dynamic part of the web site the is price and arrival information of onion in various markets is available as Market Information System link that has developed using Active Server Pages.

Further, advisory services would be available to the farmers about varieties, pest and disease management, post harvest handling, storage structures, grading and packing etc.