Evaluation of Eleven Different Citrus Cultivars as Ring Pattern Virus Disease Indicator Plants in Northern Iran

Y. Ebrahimi, Fatemeh Anvari and K. Shakholleslami

ABSTRACT. The ring pattern virus disease was reported by Habashi in 1966 in Northern Iran. The leaf and fruit symptoms of this virus which has been seen in northern Iran are completely different from ringspot virus reported in European countries. A new survey of the citrus growing areas near the Caspian sea indicates that the ring pattern virus disease in gradually spreading and transmission may occur by vectors. Search for an indicator plant was conducted with 11 citrus varieties using 1-yr-old seedlings of the following: Shang-sha tangerine, local sweet orange, Arizona 861 Etrog citron, citrumelo, rough lemon, sour orange, Cleopatra mandarin, *C. macrophylla*, trifoliate orange Limu astaraii (Iranian natural citrus hybrid) and Mo-AIlem-Kooh (Iranian natural citrus hybrid). Leaf symptoms of the ring pattern virus disease appeared on Shang-sha tangerine in 59 days and on the local sweet orange 120 days after inoculation. No symptoms were observed on the remaining varieties during the last 3 yr of the experiment.

Ring pattern is a new serious virus disease especially in the Caspian sea region reported by M. Habashi (2) in the eastern part of Mazandaran province in 1966. A recent survey has confirmed that the ring pattern has gradually spread in the citrus growing areas of Mazandaran and Gilan provinces, but Chalus and Noshahr are the most infected areas in the Mazandaran province. The leaf and fruit symptoms of the virus in northern Iran, are completely different from the ringspot virus reported in European countries, which is a complex virus disease related to psorosis (1, 5, 6, 7). The yellow ring with a green center on fruit after the color break are the symptoms of the ring pattern disease and infected fruits drop prematurely (4).

Since 1980, it has been assumed that the ring pattern virus has been spread by insect vectors or by horticultural tools. Thus, an indicator plant was needed. Eleven citrus and poncirus varieties were collected from the Kotra Citrus Experiment Station, and inoculated with the ring pattern infected inoculum in 1983.

MATERIALS AND METHODS

One-yr-old seedlings of 11 following varieties were evaluated: Shang sha tangerine, local sweet orange, Arizona 861 Etrog citron, citrumelo, sour orange, cleopatra mandarin, *C. macrophylla*, trifoliate orange, Limu astaraii, Mo-allem-Kooh and rough lemon (3). The seedlings were planted in 15x30 cm black plastic bags containing pure river sand treated with a benomyl solution (10,000 ppm) and were inoculated in August 1983, with ring pattern infected inoculum from a local infected sweet orange tree. Each seedling was inoculated with five infected buds and for each selected variety three inoculated seedlings were used and a single seedling was left as a control. All seedlings were pruned, and sprayed with Greenzit (3000 ppm) solution every 10 days. Other horticultural practices were taken to maintain good growth of the seedlings.

RESULTS AND DISCUSSION

Leaf inspection for the ring pattern symptom was started 21 days after inoculation. The first symptom was observed on Shang sha tangerine after 59 days followed by local sweet orange seedlings 120 days after inoculation. In May 1984, the experiment was repeated with Shang sha tangerine and local sweet orange seedlings again. The leaf symptom of ring pattern disease was observed on Shang sha tangerine in 58 days and on local sweet orange in 117 days.

No leaf symptoms have been observed on the other cultivars so far.

LITERATURE CITED

1. Arroyo, L. E.
   1984. Elimination of citrus ringspot virus by shoot-tip grafting, p. 177-179. *In* Proc. 9th Conf. IOCV. IOCV, Riverside.
2. Dehyar, K. and M. Habashi
   1974. Citrus ring pattern virus in the Caspian Sea areas of Iran. Iranian J. Plant Path. 10: 17-20.
3. Ebrahimi, Y.
   1975. Citrus varieties in Iran. Dezful Citrus Meeting, Safiabad, Dezful, Iran.
4. Ebrahimi, Y.
   1985. The citrus production, maintenance and distribution of free planting materials in Islamic Republic of Iran. FAO Meeting, Rome, Italy.
5. Timmer, L. W. and S. M. Garnsey
   1980. Natural spread of citrus ring spot in Texas and its association with psorosis-like disease in Florida and Texas, p. 169-173. *In* Proc. 8th Conf. IOCV. IOCV, Riverside.
6. Vogel, R. and J. M. Bove
   1980. Citrus ringspot in Corsica, p. 180-182. *In* Proc. 8th Conf. IOCV. IOCV, Riverside.
7. Wallace, J. M. and R. J. Drake
   1968. Citrange stunt and ringspot, two previously undescribed virus diseases of citrus, p. 177-183. *In* Proc. 4th Conf. IOCV., Univ. Florida Press, Gainseville.