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## International Organization of Citrus Virologists Conference Proceedings (1957-2010)

### Title

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### Permalink

<https://escholarship.org/uc/item/1688m9xh>

### Journal

International Organization of Citrus Virologists Conference Proceedings (1957-2010), 10(10)

### ISSN

2313-5123

### Authors

Ebrahimi, Y.  
Anvari, F.

### Publication Date

1988

### DOI

10.5070/C51688m9xh

Peer reviewed

# The Susceptibility of Six Natural Citrus Hybrids to the Tristeza Virus Disease in Northern Iran

Y. Ebrahimi and Fatemeh Anvari

**ABSTRACT.** There are many natural citrus hybrids in the citrus growing areas of Iran and 20 are in the collection at the Kotra citrus experiment station in northern Iran. With the occurrence of tristeza virus disease in northern Iran, the susceptibility of some polyembryonic hybrids to tristeza virus disease was tested. These selected were: Minoo, Adib, Tagavi, Shel-mo-halleh, Moalem-Kouh and Limu astaraii. Seedlings of the hybrids were budded in 1977 with nucellar Thompson navel orange and inoculated with five tristeza-infected buds in 1978. The first decline symptoms of tristeza were found on Minoo rootstock 2 months after inoculation, and on Tagavi, Limu astaraii, Moalem-Kouh and Adib from 2 months to 5 yr after inoculation, respectively. No reaction of the tristeza virus was found on Shell-mo-halleh rootstock so far.

The use of rootstocks for the citrus propagation in Iran is not very old (approximately since 1919). Prior to 1919 the seedlings of all citrus cultivars were used exclusively for the establishment of citrus groves. Up to 1962 local sweet orange seedlings were propagated by citrus growers of the North and this procedure is still used for Mexican lime in the southern belt (1, 2, 3).

As is well known, propagation by seed of many citrus cultivars produces from 0-50% zygotic seedlings, which are off-type and these are called natural hybrids in Iran. During the last 27 yr, many of these natural hybrids have been collected from the North and the South and planted in a citrus collection at the Kotra Citrus Experiment Station in the North. Some of them are polyembryonic and have been evaluated for their susceptibility to virus, virus-like, and fungus diseases, except tristeza. With the occurrence of tristeza virus disease in the Caspian Sea region the six following hybrids, called locally: Minoo, Adib, Limu astaraii, Shell-mo-halleh, Tagavi, Moalem-Kouh were chosen and rated for their susceptibility to the tristeza virus disease. This experiment was conducted at Ramsar Citrus Experiment Station between 1976 and 1985.

## MATERIALS AND METHODS

Fifty mature seeds of each candi-

date cultivar were collected in December 1976. The seeds were kept in pure water for 12 h and then washed, treated with a quinolinol sulfate solution (8000 ppm). In 1977 the seeds were planted 10 cm apart in pure river sand, treated with benomyl fungicide (10,000 ppm) solution in the greenhouse. In July, 1977, the young seedlings of the above varieties were transplanted into black plastic bags, 15x30 cm, containing pure river sand. The seedlings were sprayed with Greenzit compound (3000 ppm) solution every 10 days, and irrigated every other day. In November, 1977, the seedlings were budded with the nucellar Thompson navel orange and inoculated with five tristeza-infected buds in 1978 (5). The budded seedlings were then transplanted into 20x30 cm black plastic bags consisting of sand, leaf compost, and aged cow manure. Care were taken to keep the materials in perfect growth condition, and plants were carefully observed to detect any tristeza symptoms.

## RESULTS AND DISCUSSION

Minoo was the first rootstock which showed yellowing of veins 2 months after inoculation and after 4 more months the leaves had turned completely yellow (4). When the roots were checked, there were no feeder roots present, indicating that Minoo is very susceptible to tristeza. Seedlings of Minoo did not react to tristeza

when they were inoculated with tristeza. Tagavi and Mo-allem-kouh showed signs of susceptibility with stunted growth and yellow veins after 4 months. These two rootstocks were next to Minoo in susceptibility to tristeza virus. Adib and Limu astaraii showed symptoms 1 yr after inoculation and zinc deficiency was also observed on the leaves.

Adib and Limu astaraii rootstocks were not comparable with Minoo, Tagavi and Mo-Allem-Kouh. It seemed they could be used as rootstocks with mild strains of tristeza. No signs of tristeza disease have been found on Shel-mo-halleh rootstock so far. The Minoo rootstock can be a good indicator to detect mild strains of the tristeza virus.

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