

Table 2. Effect of fungicide sprays expressed as percent of controls on severity of rust infection of fuchsia 'Bonanza'.

Treatment	Defoliation	Number of Flowers	Area of Pot Covered
Untreated	100	0	0
Baycor	4	68	70
Plantvax x 1	69	23	15
Plantvax x 2	17	58	45

DISCUSSION

The results given above show that irrespective of the method of assessment, outbreaks of fuchsia rust can be safely and significantly reduced by treatments at 10 day intervals with Baycor fungicide.

CITRUS NURSERY PRACTICES IN HUNAN PROVINCE, PEOPLES REPUBLIC OF CHINA

PETER B. SMITH

Sunraysia Nurseries
Gol Gol, New South Wales 2739

My observations are limited to the Central Southern Province of Hunan, latitude approximately 26°N. Citrus is also grown in a number of neighbouring provinces having a similar climate.

Historical records indicate citrus culture began in China about 4,000 years ago and was widespread by the Qin and Han periods, (221 BC to 220 AD). Changsha, the capital of Hunan Province, is the site of an archaeological find of great importance to the citrus world. Seeds of a citrus species were unearthed in a 2,100 year old tomb.

Citrus research was accelerated after the establishment of the Peoples Republic of China in 1949. However the cultural revolution of the 1970's was responsible for the destruction of vast areas of citrus orchards as citrus was then regarded as a revisionist fruit.

The census figures of 1980 show that China had 180,000 hectares of citrus planted of which 67,000 hectares was bearing. Production reached 797,000 tonnes in 1981. The production per hectare figure of less than 12 tonnes is extremely low by Australian standards.

Climate, soils, and topography. The climate, in the region to which my observations are limited, is one of very cold winters with light snowfalls and very hot humid summers. The extreme minimum temperature recorded is -7°C and the extreme maximum is 39.8°C . January is the coldest month with a mean temperature of 5.9°C while July has a mean temperature of 29.1°C . The mean annual rainfall is 1,423 mm (57 in.) and the monthly mean hours of sunshine is 136 hours, approximately half that of the citrus region in Gol Gol, New South Wales.

Soils are medium and appear to be free draining and well aerated. The natural red soils are acidic with acidity increasing with depth. A typical profile for a natural soil was given as:

Depth (cm)	pH
0 - 20	4.2 - 4.5
20 - 40	3.8 - 3.9
40 - 60	3.6

NURSERY PRACTICES

(a) Scion material

The main cultivar grown, due to its cold hardiness, is a Satsuma type mandarin named 'Wenzhou Mikan.' Research is being conducted in China to select early maturing clones with above average fruit quality and bearing ability. Virus clean mother trees are not as yet being maintained and, in general, budwood is not being selected from specific clonal cultivars. Some sweet orange and some other mandarin cultivars are grown. Observations are being carried out at research institutions on these cultivars for cold tolerance, cropping levels, etc. Virus indexing and the establishment of selected mother tree plantings commenced in 1983.

(b) Rootstock material and management

Poncirus trifoliata is the only rootstock being used. The advantages of cold tolerance, resistance to nematodes, resistance to root rotting fungi and suitability to heavy loams is widely recognised. Seed is not selected from specific clonal cultivars although work commenced along these lines in 1983.

Trifoliata seed is extracted during mid- to late-October. Most nurseries over-winter seed by sowing in early November in open seed beds. The beds are prepared with the incorporation of organic matter. Seed is broadcast, covered with light dressing of sandy soil and the bed is then covered with a layer of organic matter to conserve warmth and moisture. In the

1982-83 season some 10% of seed stored in this manner germinated early and was killed by winter frosts.

An alternative method of seed storage is to blend it with moist sand and store at room temperature (approx. 4°C to 10°C). However, it is considered that losses due to rodent and fungal damage are greater than those experienced when seed is sown in November.

Pre-germination is often practised when seed is spring-sown in beds of the same preparation as previously mentioned. Stored seed is moistened, placed in plastic bags, and plunged into composting heaps of organic matter. Temperatures are monitored to maintain a constant 25°C with germination commencing in 4 to 7 days. The seed is again broadcast and covered with sand and organic matter. Low plastic tents are erected on bamboo sticks to conserve warmth within the seed bed.

Due to high rainfall in spring inhibiting field work, most propagators favour autumn transplanting of seedlings to nursery rows. However, some spring transplanting is practised.

There is a great variation in spacing plants in nursery rows, as no mechanical aids are used. In general, nursery trees are grown much closer together than in Australian nurseries, the average planting distance being 30 to 60 cm between rows and 7 to 10 cm between plants.

(c) Budding techniques

Autumn budding during September, using a normal "T" bud tied with plastic budding tapes cut from sheets, is the practise of all nurseries visited. Success rates of 90% are expected. Buds are inserted very low — 4 to 8 cm above ground level.

Stocks are cut back to the bud in spring. Lopping or bending of stocks to force the bud is not practised, and misses are side bark-grafted in March.

(d) Nursery management

All planting, cultivation, and lifting is done by hand. Trees are produced in 3 to 5 years from seed sowing. Scions are not staked or headed; however they are trained to a single rod for the first 20 to 30 cm of growth. Orchards are all hand-worked hence there is currently no need to train trees to a high single trunk.

Little attention is paid to nursery hygiene. No soil sterilisation is practised and nurseries are not fenced. Both red and rust mites abound together with leaf miner and a vast array of scale insects. Trees are not insecticide treated in any way prior to dispatch.

CONCLUSIONS

There is a great need to modify nursery practises in every aspect to produce trees for Chinese orchards of the future. Both stock and scion selection of existing and newly introduced cultivars is of paramount importance. This work has now begun. The establishment of virus-free mother tree plantings of selected clones, and their constant monitoring, is also underway.

Nursery hygiene and tree training to accommodate mechanized orchard management is a new concept now being demonstrated, together with all of the inherent benefits of container-grown tree production.

TOWARD A WORKABLE SOFTWOOD CUTTING TECHNIQUE FOR PROPAGATING AVOCADOS

T. TROCHOULIAS,

Tropical Fruit Research Station, Alstonville, New South Wales

G.W. GRIFFITH and N.G. SMITH

University of New England, Armidale, New South Wales

Abstract. Comparisons were made of the rooting responses of cuttings taken from terminal flushes of 'Duke 7' avocado which were stimulated by wire constriction, etiolation, marcottage, and combinations of these treatments. After seven weeks the treated terminal shoots were removed from the parent tree and placed in a peat-vermiculite mix in 125 mm pots under mist. Only seven cuttings with wire constriction, etiolation, and marcottage, or a combination of them, produced roots after 57 days. All cuttings produced a vegetative flush within 8 to 16 weeks.

INTRODUCTION

Avocado trees are usually propagated by grafting proven scion cultivars onto avocado seedlings, which are very heterozygous. Recently there has been interest in using vegetatively propagated rootstocks, particularly from the Duke 7 cultivar which has shown moderate resistance to *Phytophthora cinnamomi* (9). Frolich (5) pioneered the "etiolation technique" for vegetatively propagating rootstocks and this has been modified and patented by Brokaw (4). The modified technique involves the following basic steps:

a) A scion of the rootstock cultivar is grafted on to a nurse seedling.

b) A girdling ring is fitted over the intermediate rootstock and the grafted plant is etiolated for one month.