THE ROD TALLIS MEMORIAL AWARD

This award was set up in memory of the late Rod Tallis, a young Sydney nurseryman who had been very active in IPPS. The award is offered each year in the State where the Conference is being held. Young people under 25 years of age in nurseries, educational institutions, and government departments who have an interest in plant propagation are invited to apply.

The applicants, who need not be members of IPPS, must outline why they should be given the chance to attend the IPPS Conference. They also have to present a biography and outline their interest in horticulture and plant propagation.

The winner of the award attends the Conference as a guest of the Society and must prepare a paper for presentation at the Conference. The winner also receives a book award.

In 1986 Alison Fuss, a student at the Waite Agricultural Research Institute, won this year's award and presented the following paper:

GLASSHOUSE PEACHES: FORCING OF BUD BURST AND ITS EFFECT ON FLORAL DEVELOPMENT

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Murray Bridge, which is 85 km southeast of Adelaide, is one of South Australia's significant glasshouse areas. In the past, tomatoes and cucumbers have been the main crops grown, however at present such crops are unprofitable. In this economic situation there has been a great interest shown by the growers in finding alternative crops which will bring greater returns.

Following the success of temperate-zone fruits, such as apples and peaches, in the tropical and subtropical regions of the world, it was suggested that they may also be suited to the hot and humid conditions of a glasshouse.

In December 1984, a glasshouse of peaches was established at Murray Bridge. A cultivar of a low chilling *Prunus persica* hybrid developed in Florida, U.S.A., was budded onto a nematode-resistant rootstock, 'Nemaguard'. The trees were closely spaced and four main branches were trained from the main stem onto the outer wires of a low, 5-wire T trellis.

Work began in February, 1986, to study the vegetative and

[1] Rod Tallis Memorial Youth Award for 1986.

floral development of two peach cultivars 'Maravilha' and 'Flordagold' as well as the nectarine, 'Sunred'. The chilling required by these cultivars is in the range of 275 to 300 hours at temperatures below 7.2°C. This is considerably lower than the 400 to 1000 hours of chilling required by those cultivars presently being grown in southern Australian orchards.

It was hoped that if these trees could be forced to flower and fruit during autumn and winter, then they could be manipulated to fruit at any time of the year, thus giving the grower total control over time of production.

Growth of the trees had been extremely vigorous with shoots extending in all directions, but predominated by strong water shoots reaching to the roof of the house. Shoots were pruned to within 0.5 m of the trellis so that the trees were more managable. This was followed by a more selective pruning during which attention was paid to those shoots most likely to produce flowers, as well as considering the shape and training of the trees. Training involved the bending and laying down of upright shoots to reduce apical dominance and to promote floral initiation and the further development of lateral floral buds. In the case of vigorous trees this practice also promotes the development of spurs capable of fruiting in the following year.

It is well established that defoliation forces the development and bursting of peach buds out of season provided the trees have not entered into the state of true dormancy or rest. During the latter period internal inhibition prevents growth from being induced even if conditions suitable for growth prevail. The effectiveness of chemical and hand defoliation treatments on bud burst were studied. Trials conducted by G. R. Edwards (Priv. Comm.) in the Philippines suggested that 2% zinc sulphate was a suitable defoliant for *Prunus persica*. This was tried as a foliar spray but had no effect. Spraying was repeated with 3½% zinc sulphate but caused no more than 5% leaf-burn. These chemical defoliation treatments were therefore concluded to be unsuccessful. Rather than trying a higher concentration which might have caused twig die-back and splitting of the green bark and would have delayed treatment, thus increasing the likelihood of entering dormancy, it was decided to hand defoliate all trees.

Chemical growth regulators are also known to force bud burst. From work done in Israel and the Philippines, five treatments were chosen and applied 3 days after hand defoliation. The treatments included cyanamide (2% a.i.), potassium nitrate (4%), thiourea (2%), DNC-oil (8%), DNC-oil (8%), followed 7 days later with a mixture of potassium nitrate (4%) plus thiourea (2%), and a control using distilled water. Treatments were applied by dipping three twigs per treatment per tree. These three twigs were chosen to represent the range of shoot orientations and are referred to as: up, horizontal,

and down.

The results obtained from these treatments differed greatly from those expected. Literature stated that potassium nitrate is more effective in forcing floral buds, rather than vegetative buds, to burst. In this study, although it forced more floral buds to burst than any other treatment, it was found to be more effective at forcing vegetative buds. Other variations from expectations were caused by the cyanamide and the two treatments involving DNC-oil. At the concentrations used, all three caused burning of the buds and twigs. Despite these failures the trees recovered and grew vigorously, reaching the roof of the house within 8 weeks of defoliation.

Table 1 shows that only a very small proportion of the buds forced to burst by defoliation were floral, and it was not until these buds developed further that differences in shoot orientations emerged. Not only were there few floral buds present but the proportion of these which actually set fruit was also very low. The 3% on the horizontal shoots represents one fruit set, while the 7% on the downward shoots represents three fruits set. That is a total of four fruits set on the entire 24 experimental trees. The decrease in numbers of reproductive structures with development is due to natural abscission processes and was not unexpected since many flowers were grossly abnormal.

Table 1. Effect of shoot orientation on development and behavior of buds.

		Shoot Orientation		
		up	horizontal	down
Percent of buds which were	Floral	3.3	1.8	2.1
	Vegetative	96.7	98.2	97.9
Percent of floral buds which reached	Full bloom	42	36	55
	Petal Fall	26	19	31
	Fruit Set	0	3	7

Normally, flowers of *Prunus persica* have 5 small green sepals, 5 regular and brightly coloured petals, many stamens and a solitary pistil centred within the receptacle. However, only a few of the flowers present fitted this description. The abnormalities observed were of many types, the most common being large sepals, the presence of two pistils, and the absence of a pistil. In some cases more than one abnormality occurred, as with the frequently observed sterile leafy flower which had 5 large leafy sepals supported on a long pedicel but no petals, stamens, or pistil. Other abnormalities included petalized anthers, several small rudimentary ovaries within a receptacle, and the initiation of two flowers on the one pedicel. Such findings are consistant with the work of other researchers, such as Lloyd and Couvillon (5), where bud burst was forced by defoliation.

Despite difficulties encountered with chemical defoliation and

chemical bud-burst treatments, the growth of peach trees at the most unexpected time of the year and under such unusual environmental conditions has emphasized the importance of the need for different cultural practices in this situation. The main change likely to increase the number of floral buds forced and the proportion which set fruit would be the use of a narrow upright trellis on which the trees could be espaliered. This system might suit the glasshouse situation and the tying down of upright shoots, coupled with early fruiting, could well be an effective way of controlling vigour. It would reduce the competition between long shoots and buds for the available resources, such as carbohydrates and light, thus improving floral initiation and floral development.

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