CHIP BUDDING — A POSSIBILITY FOR PAWPAWS (PAPAYAS)

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REVIEW OF LITERATURE

The common pawpaw or papaya (*Carica papaya*) has been cultivated in Australia for many years but has not become of much commercial importance. Part of the reason behind this has been the problems involved with maintaining good lines and the inability to take advantage of a chance superior type(s) which may appear in mass populations.

Similarly, dioecious lines present horticultural difficulties which result in inefficiency of the cropping system.

Asexual or vegetative propagation offers an opportunity to overcome these problems (3,6). Cuttings have been successful in South Africa (1) and Australia, and side grafts have been used in Australia (4), Papua New Guinea and Asian countries (2). These do not make the best use of available scion (such as could be obtained from a chance seedling), so other methods need to be investigated.

The vegetative propagation of pawpaws has met with varied success and tissue culture techniques similarly have not been finalised as yet (2,5).

The use of chip budding could offer a possible alternative method in which the number of plants from scarce budwood can be maximised.

MATERIALS AND METHODS

Pawpaw seeds were germinated and grown in seedling trays, in a peat/vermiculite mix. The seedling trays were placed in a fibreglass-covered screen house (this mix is not suitable for outside use as it is easily moved by heavy rain and leaches quickly). Seedlings were thinned to 1 plant/container after germination and then given weekly applications of Aquasol®.

Seedlings were vigorous but tended to crowd after 30 cm. in height. Stem basal thickness varied from 5 to 12 mm. This range of material was considered to be suitable for budding close to the base of the stem.

To produce small budwood pieces approximately the same thickness as the stock seedlings, the apical point of the scion

stock plants was removed. This forced the production of side shoots.

The usual chip budding technique was used; however, in this case both the rootstock and scion stock plants were maintained in an active state of growth. Normally, this technique requires either or both the rootstock or scion wood to be dormant (3). Parafilm (or florist tape) was used to bind the buds.

RESULTS

Preliminary trials on poor quality stocks indicate that the soft, vigorous seedlings will give the best results. A batch of 50 seedlings done under these conditions resulted in an 80% success of buds pushing out. However, 50 seedlings which were left a further three weeks in the same size trays and using older, harder scion material, resulted in only a 58% success rate which would be too low for commercial operation. A further trial of 200 seedlings was largely destroyed by cyclone Gretel and cannot be presented here.

DISCUSSION AND CONCLUSIONS

It is thought that the rootstock seedlings would have benefitted from potting on into a larger container, eg. 1 to 1½ litre plastic bag using U.C. type mix before crowding occurs. This should allow for a more uniform size plant and make budding easier, as budding in the trays can become awkward.

The ideal size of the pawpaw seedlings has yet to be determined and is dependent on the size of budwood available, although 30 to 40 cm is considered the maximum.

As the stock plants age, they lose a clearly defined cambial layer producing a matted fibrous type of tissue under the bark region. Initial work suggests that this type of stock is not very useful as it is difficult to match cambial areas and has not given good results.

Buds (forced by removing the apical point of the plant) tended not to be as symmetrical as the stocks, being irregular and usually curving upwards towards the light. It was difficult to get many shoots of appropriate size for budding. However, this could be overcome by using budded plants. Once the initial buds have taken and grown out to useable size, these can be used as budwood, leaving a few shoots at the base to regrow. The shoots from the chip buds tend to be more symmetrical and are easier to use for a bud source.

Some problems were encountered with the thickness of the bark on the stock plants in relation to the thickness of the bark on the budwood, as well as the "take" of the chip piece on the bottom or heel of the chip. The bark at the base of the

stock plants, even when quite young, can be quite thick and can lead to some matching problems. To overcome this problem insert chip buds higher on the stock plants if budwood size permits. The second problem was that the buds sometimes did not take from the bottom or heel of the chip, although, the bud took on the back. The buds tended to die from the bottom up. It seems that this is the critical area of the bud. Some shrinkage has been observed to occur on the stock heel and it may be necessary to sit the bud slightly below the level normally correct for chip budding. This would fit with the difference in bark thickness to afford a better match.

Mother stocks can be maintained in pots for many months but tend to lose vigour. This results in poor quality scion material which would result in lower success rates. It is felt that a continual turnover of these to ensure vigour of the scion would be desirable. Similarly, a good supply of vigorous seedlings from which to select is required.

By using vigorous seedlings and young, vigourous, well-matched scions, chip budding of papaws can be successful. The freshness of budwood is very important as it desiccates quickly. It is also important to maintain vigorous growth of the budded plants to avoid stunting.

Whilst it would take some practice to perfect the technique, it is easy to learn and requires no special facilities or abilities. An example of this was that a work-experience student was able to obtain a 68% success rate without previously having used this technique.

This technique should also be of use for researchers and plant breeders to maintain lines and carry out agronomic trials. Further refinement of the technique is possible. A full yield trial to compare yields etc. is necessary to justify the use of this technique on a commercial scale.

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