

GUIDELINES FOR AN AVOCADO IMPROVEMENT PROGRAMME

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OPSOMMING

Riglyne vir die ontwikkeling van 'n avokadoverbeteringskema, gebaseer op ondervinding wat met die Suid-Afrikaanse Sitrus Verbeteringskema opgedoen is, word aanbeveel. Die belang van vier basiese beginsels wat in aanmerking geneem behoort te word by die ontwikkeling van 'n verbeteringskema word gespreek nl.

- Seleksie van meerderwaardige ouerbome*
- Produksie en bewaring van virusvrye plante*
- Vermeerdering en verspreiding van plantmateriaal*
- Rekordhouding, registraste en sertifisering*

Daar word aanbeveel dat die verbeteringskema onder die beskerming van die Suid-Afrikaanse Plantsertifiseringskema ontwikkel word.

SUMMARY

Guidelines for the development of an avocado improvement programme are suggested based on experience of the South African Citrus Improvement Programme. The importance of four basic principles that should be considered in the planning of an improvement programme, are discussed i.e.

- Selection of superior parent trees*
- Production and conservation of virus free plants*
- Multiplication and distribution of plant material*
- Record keeping, registration and certification.*

It is suggested that the improvement programme be developed under the auspices of the South African Plant Certification Scheme.

INTRODUCTION

For many years the South African fruit industry has been in the privileged position of being practically the sole supplier of fresh fruit to Europe in the off-season. Due to low production costs the South African fruit grower could supply fruit to these markets at very competitive prices despite the long distances fruit had to be shipped.

During recent years, however, it has become increasingly apparent that profit margins

are being eroded by steadily increasing production costs as well as the escalation of competition from countries in the Southern Hemisphere. This state of affairs could only be met by adopting more efficient cultural practices and growing cultivars capable of producing high yields of superior quality fruit

This objective can be attained by implementing an efficient plant improvement programme. Consequently the major fruit industries in South Africa have given serious consideration to this aspect since the early 70's.

Burger (1973) formulated the basic principles for plant improvement programmes for fruit in the RSA based on a detailed study of the plant improvement programme in France. Some of these proposals concerning strategically situated centralized foundation blocks were initially rejected in favor of a decentralized system where foundation trees and multiplication blocks were established at participating nurseries.

The weaknesses of such a system, however, soon became apparent, in that the accurate control of certified plant sources and the movement of certified propagation material were virtually impossible. The weakness of such decentralized programmes has been observed in the USA where an improvement programme that was originally held as a model for the South African situation, is showing signs of failure (Hutchinson & Johnston 1984).

Although the decentralized Citrus Improvement Programme (CIP) is still operating as an unofficial interim programme, the original proposals for a centralized official programme are now accepted by both the Citrus and the Deciduous Fruit Industries.

The interim Citrus Improvement Programme is gradually being phased out as certified propagation material is being released to participating nurseries by the official South African Citrus Improvement Programme (SACIP) (Burger 1984). The official improvement programme for deciduous fruit (SAPO) has come into full operation during 1984.

The requirements for these programmes are incorporated in the South African Plant Certification Scheme subject to the plant Improvement Act no. 53 of 1976.

IMPLEMENTATION OF AN AVOCADO IMPROVEMENT PROGRAMME (AIP)

1. Preliminary considerations

The South African Avocado Growers Association (SAAGA) has recently expressed the desire to initiate an improvement programme for avocados (AIP). It was suggested that a decentralized programme would be the most suitable system in view of the high capital expenditure involved in the acquisition and management of a foundation block.

Although this point of view is fully appreciated, such an argument does not justify the implementation of a programme that has a proven high failure potential. Other options are available within the framework of the S.A. Plant Certification Scheme which should be acceptable to all parties concerned.

At this stage in the development of the AIP, the numbers of debatable issues are numerous. The pertinent questions are: How should the AIP be implemented? What basic principles should be taken into account? Who is responsible for certain actions?

The remainder of this paper will therefore be devoted to these questions and subjects relevant to actions that should be initiated during the planning stage of the AIP.

As a point of departure it is imperative to note that a plant improvement programme must be based on four principles i.e.

- a. Selection of superior parent cultivars and rootstocks.
- b. Production and conservation of virus and viroid free plants.
- c. Multiplication and distribution of propagation material.
- d. Registration, certification and recording of all relevant information in connection with plants and propagation material.

The first three principles correspond to the four phases in the flow diagram of the proposed AIP shown in Fig. 1 while the fourth principle applies to all aspects of the AIP from the selection of the original parent material up to the final establishment of certified nursery trees in commercial orchards.

Suggestions for the implementation of an AIP based on the four basic principles are subsequently discussed.

2. Phases in the development of an AIP

2.1. Selection of superior parent trees Phase I

The selection of scion and rootstock parent trees with reliable records for superior performance over a number of years is of primary importance in the establishment of a sound foundation for the AIP and is certainly the most crucial stage in the development of an improvement programme. Any miscalculation at this stage could have disastrous consequences to the avocado industry and would most certainly undermine the credibility of the programme.

2.2. Production and conservation of nucleus plants Phase II

The production and conservation of a disease free plant nucleus of all registered cultivars and rootstocks will be the responsibility of the Citrus and Subtropical Fruit Research Institute (CSFRI).

As little is known about viral and viroid diseases of avocados, it would be prudent to take all possible precautions to guarantee the phytosanitary status of plant material in the programme. It is therefore suggested that plant material introduced into the AIP should be freed of pathogens by means of shoot tip grafting (STG) (Nel & de Lange, 1984).

Nucleus plant sources will be permanently conserved in a nucleus block housed in an insect free tunnel at the CSFRI to serve as a primary source of plant material for the AIP.

2.3. Multiplication and distribution of plant material

2.3.1. Multiplication Phase III

Selections conserved in the nucleus block must be multiplied in sufficient quantities to supply in the demands of policy undertake such a task; an acceptable arrangement should be devised to overcome this problem.

The most desirable solution for the multiplication of propagation material would be for SAAGA to acquire suitable land that can be developed as a foundation block along the lines of those established by the Citrus and the Deciduous Fruit Industries.

An alternative interim solution could be the establishment of a number of foundation trees at the CSFRI to supply plant material to a limited number of nurseries for the establishment of mother blocks. These mother block nurseries would then increase graftwood on contract for SAAGA.

The major obstacle at present is the supply of sufficient certified seed or rooted cuttings for rootstocks. Present research at the CSFRI is yielding promising results for the mass production of rootstock clones *in vitro* (Harty 1984). When the techniques have been refined, the mass production of rootstocks could be commissioned to commercial tissue culture laboratories.

2.3.2. Distribution Phase IV

Only nurseries qualifying under the S.A. Plant Certification Scheme will be entitled to certified material. Plant material will be allocated by an official allocation committee under the chairmanship of the Director of Plant and Seed Control and will be composed of representatives of the CSFRI, SAAGA and avocado nurserymen.

Regardless of the final procedure adopted for the multiplication of avocado propagation material, the recordkeeping and distribution of plant material to qualifying nurseries would remain the responsibility of SAAGA.

2.4. Recordkeeping, registration and certification

A sound organization can only be maintained if accurate records are kept at all times during the development and implementation of an improvement programme.

To realize this goal close co-operation between the official regulatory service (Division of Plant and Seed Control), the CSFRI and the representatives of the avocado industry (SAAGA), is essential.

For each new selection introduced into the AIP a cultivar register must be opened. The object of this register is to record all relevant information concerning the original parent trees and progress through various stages of development (STG, virus and viroid indexing, horticultural evaluation etc.), up to the final establishment of certified foundation trees. The maintenance of the register will fall under the auspices of the CSFRI.

The Division of Plant and Seed Control will witness and certify the distribution of plant material during all phases of the AIP, from the nucleus block up to the final certification of trees in the nursery.

SAAGA will be responsible for record keeping on all matters concerning foundation trees or mother blocks, nursery trees and the distribution of propagation material. The objective of this record will be to keep track of progeny performance of each individual selection from the nucleus block.

In planning the record keeping procedures of the AIP, it is suggested that extensive use be made of the guidelines for the S.A. Citrus Improvement Programme (Burger 1984).

3. Nursery standards and plant certification

The ultimate objective of an Avocado Improvement Programme is to ensure that superior quality trees, free from declared harmful pests and diseases, are established. In an official programme, trees supplied by participating nurseries are guaranteed by the government to be true to type and free from declared pests and pathogens.

In order to back up this guarantee, participating nurseries and the trees produced must comply with certain standards and phytosanitary requirements to qualify for certification.

3.1. Nursery standards

As was mentioned earlier, only nurseries registered under the S.A. Plant Certification Scheme are entitled to receive certified material for the production of certified trees. Before the AIP can be implemented officially, nursery standards must therefore be compiled by an official avocado improvement committee composed of representatives of Division of Plant and Seed Control, the CSFRI, SAAGA and avocado nurseries.

These nursery standards which include requirements concerning the nursery site, horticultural standards and phytosanitary tolerances, must be incorporated in the S.A. Plant Certification Scheme for publication in the Government Gazette.

3.2. Certification

The certification of plant material as Super grade or Choice grade refers to the virus status of the plant material. Choice grade material is certified as free from declared viruses and viroids which are normally easy to detect and eliminate permanently in plant material. Some seed and insect transmissible viruses or latent viruses may be present in such material. Super grade refers to material free from all declared viruses or other related pathogens.

The certification of plant material is always subject to the phytosanitary requirements and horticultural standards stipulated in the S.A. Plant Certification Scheme.

CONCLUDING REMARKS

The development and maintenance of an efficient improvement programme is a difficult task, requiring much effort and dedication. Any attempt to devise a detailed blueprint for the avocado improvement programme on paper would be a futile exercise because each fruit crop has certain specific requirements.

Nevertheless, the broad outline for the AIP suggested in this paper, is based on

experience gained from the S.A. Citrus Improvement Programme and other improvement programmes during the past 15 years. The basic principles discussed, have been proved in practice with a wide range of fruit crops. The avocado industry would therefore be well advised not to embark on a programme based on less demanding standards.

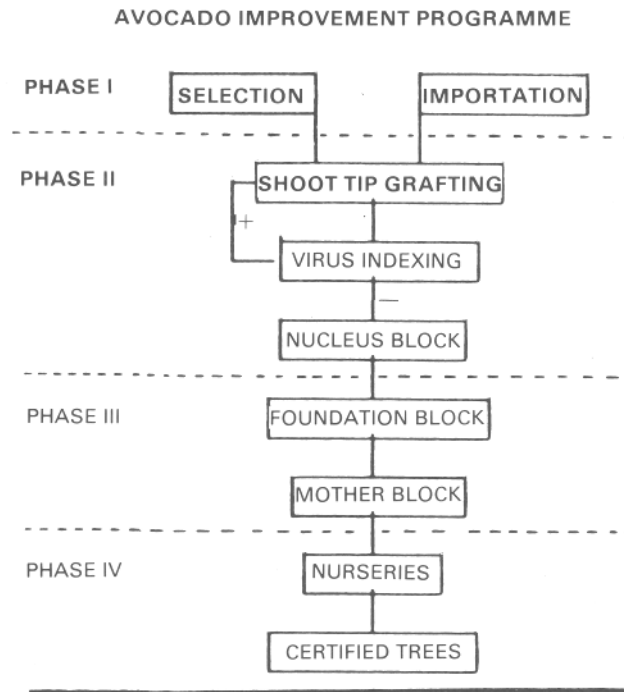


FIG. 1 Flow Diagram of proposed avocado improvement programme

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