

Avocado Research at South Coast Research and Extension Center

Robert F. Bevacqua

South Coast Research and Extension Center, University of California, 7601 Irvine Boulevard, Irvine, CA 92718, USA

Abstract. The South Coast Research and Extension Center (SCREC) is an 81 hectare (200 acre) facility where University of California faculty conduct field research on subtropical crops. At present, there are eight major avocado projects in the areas of germplasm collection, breeding, horticulture, pathology and entomology. The dominant research objectives are control methods for avocado root rot and breeding for improved cultivars.

SCREC was established in 1956 as a field station for subtropical horticultural research. It was created with the strong support of the California Avocado Society which urged the development of a facility where research on disease-resistant and high yielding cultivars could be done (Millen, 1962). Such research has been underway now at SCREC for 35 years.

The environmental setting for SCREC is representative of coastal southern California. The climate is subtropical. Average annual rainfall is 20 to 38 cm (8 to 15 inches) which tends to fall in the months of January, February and March. The mean maximum air temperature is 29C (85F) and occurs in July or August. Mean minimum air temperature of 6C (43F) occurs in December or January. Soils tend to be sandy loams with low levels of organic matter. Soil pH ranges from neutral to moderately alkaline.

The eight current research projects on avocado are briefly discussed below under the headings of germplasm, breeding, horticulture, pathology and entomology.

Germplasm

The California Avocado Society and SCREC jointly maintain a 1.5 hectare (4 acre) germplasm collection of rootstocks and cultivars (Bergh, 1991). Sixty-one cultivars and root-stocks are represented in the collection. The collection is used as a source of propagating materials for comparative studies of avocado behavior and fruiting performance, and to safeguard against the loss of genotypes.

The collection includes 55 cultivars and 6 rootstocks established on Duke 7 clonal rootstock.

Breeding

The development of improved cultivars of avocado has been an important research activity since SCREC's establishment in 1956. The breeding program (Bergh, 1988) has yielded patents for three commercial cultivars: Gwen, Whitsell, and Esther. Of the three, 'Gwen' is the one most widely adopted by the industry. These patents have resulted in the development of a new generation of avocado breeding lines, which are currently being evaluated.

Horticulture

A major horticultural project at SCREC is the evaluation of two commercial avocado cultivars on ten clonal rootstocks (Bender and Arpaia, 1991). Prior to this study, avocado rootstocks were evaluated solely for resistance to *Phytophthora cinnamomi*. The present study focuses on other production factors, such as fruit yield, fruit size, earliness or lateness of fruit harvest, and tree growth.

The two cultivars included in the study are Hass and Gwen and the ten rootstocks are G755A, G755B, G755C (Martin Grande series). Duke 7, Borchard, D9, Toro Canyon, Thomas, G1033, and Topa Topa.

Pathology

The control of avocado root rot (*Phytophthora cinnamomi*) has been a dominant theme of research at SCREC. Present studies integrate several control methods; the use of a resistant rootstock (Duke 7), the application of the fungicides fosetyl-AI and metalaxyl, the use of organic and synthetic mulches, and the use of lime and manure as soil amendments (Menge and Ohr, 1990).

The evaluation of rootstock resistance to *Phytophthora citricola* is the objective of a study begun in 1988 (Coffey, 1990). Twelve rootstocks are being evaluated.

Black streak of avocado is the subject of a study by Ohr (1990).

Entomology

Entomological research has centered on the integrated pest management (IPM) of the three major insect pests and the two major spider mite pests of avocado (Bailey, 1989). The major insect pests are greenhouse thrip, omnivorous looper and western avocado leaf roller or amorbia. The major mite pests are avocado brown mite and six-spotted mite.

This research project has determined the development time (degree days) and flight patterns for omnivorous looper and western avocado leaf roller. It has also developed pheromones, traps, and monitoring techniques for the two above pests (Bailey, personal communication).

To achieve biological control of greenhouse thrips by the introduction of a natural enemy is the objective of a study by McMurtry (1989). Preliminary results indicate the introduced parasitoid *Thripobius semiluteus* will provide at least partial control. *T. semiluteus*, a wasp, has been established in orchards at SCREC and early monitoring indicates that when parasitization of thrips larvae by this species reaches 60 to 70 percent thrip populations decline to low numbers.

Conclusions

SCREC has a 35 year history of hosting avocado research. The breeding of improved cultivars has been and continues to be the dominant research theme. In 1985, avocado root rot caused by *Phytophthora cinnamomi* was accidentally introduced to SCREC. Since that time, control measures for this damaging disease have become an important focus for pathology research.

Literature Cited

- Bailey, J.B. 1989. IPM of insects and mites of avocado. Three-Year Review Report. SCREC. Univ. of Calif.
- Bender, G.S. and M.L. Arpaia. 1991. Avocado clonal rootstock production trial. Three-Year Review Report. SCREC. Univ. of Calif.
- Bergh, B.O. 1991. Avocado variety germplasm bank. Three-Year Review Report. SCREC. Univ. of Calif.
- Bergh, B.O. 1988. Development of improved cultivars and *Phytophthora* resistant stocks. Three-Year Review Report. SCREC. Univ. of Calif.
- Coffey, M.D. 1990. Evaluation of resistance to *P. citricola* in avocado. Three-Year Review Report. SCREC. Univ. of Calif.
- McMurtry, J.A. 1989. Biological control of greenhouse thrips on avocado. Three-Year Review Report. SCREC. Univ. of Calif..
- Menge, J.A. and H.D. Ohr. 1990. Control of root rot of avocado. Research Project Proposal. SCREC. Univ. of Calif.
- Millen, D. 1962. South Coast Field Station. Calif. Agric. 16:8-9
- Ohr, H.D. 1990. Inoculation studies of black streak disease of avocado. Three-Year Review Report. SCREC. Univ. of Calif.
- Ohr, H.D. 1990. Inoculation studies of black streak disease of avocado. Three-Year Review Report. SCREC. Univ. of Calif.