Case Study I - A Citrus grove in Zephyrhills

A total of about 40 acres of Hamlin , Valencia , Minneola, and grapefruit for the fresh fruit market were planted on Arredondo fine soil in the Zephyrhills area in 1992. The grove rows were planted in an East-West orientation with 25 feet between them.

Every 5 th row was omitted and planted with a parallel double row of slash pine trees planted 4 x 8 feet in 1991 (Fig. 1). Thus, there was a windbreak every 125 feet (Fig. 2). In 1992, the citrus trees were planted along with southern red cedar trees that were planted inside the double row of pines and adjacent to the northern pine tree row (Fig. 3). No North-South windbreaks were planted except at the ends of the 1,000-ft citrus rows (Fig. 4). Neither the windbreak trees nor the citrus have been irrigated since planting.

The owner planted the windbreaks for cold and canker protection. In 2006, the citrus trees looked healthy and were a good size for their age despite not being irrigated. The pine trees were about 60 feet tall and the red cedars about 50% to 75% of that height. Shading of the citrus trees by the windbreak appeared to be minimal in April (Figs. 5 and 6).

Fig. 1. Looking west along the south side of a windbreak row in April 2006.

Fig. 2a. Looking south at the end of the citrus and windbreaks rows in mid-morning, April 2006.

Fig. 2b. Looking north at the end of the citrus and windbreaks rows in mid-morning, April 2006.

Fig. 3. Close-up view of a windbreak row showing two rows of pines planted 4 x 8 feet with a later-planted row of southern red cedar adjacent to the left-hand pine row. Notice the layer of pine needles that apparently is an effective mulch for weed control.

Fig. 4. Looking south perpendicular to the citrus and windbreak rows.

Fig. 5. Looking east along the north side of a windbreak row. Notice the extent of shading at about 2 p.m. in April 2006.

Fig. 6. Looking west along the north side of a windbreak row. Notice the extent of shading at about 2 p.m. in April 2006.

Case Study II – A Citrus Grove North of Avon Park

This 60-acre Sunburst and Murcott grove was planted in 1985 along with a slash pine-red cedar perimeter windbreak (Fig. 1). The owner was concerned about cold protection and reducing wind scar.

The cedar trees were planted first about 3 to 4 feet apart in a single row about 30 feet from the sides and ends of adjacent citrus tree rows planted at the same time. One year later, slash pines were interset among the cedars (Fig. 2). T he windbreak trees were irrigated only the initial couple of years. Normal grove herbicides were used to treat weeds for the first few years. The windbreak trees were unaffected unless directly contacted by the herbicide. Afterwards, the build-up of pine needles appeared to prevent weed development (Fig. 3).

The windbreak trees are topped about every 3 years at 21 feet and hedged on the inside of the grove as needed. The owner indicated that the cedars appeared to be more sensitive to the grove herbicides than the pine trees.

The owner also has a small block of citrus elsewhere in Polk County in which he planted red cedar trees along the north side for cold protection. His lesson from the Avon Park grove and the 2004 – 2005 hurricanes was that cedar trees were quite windfirm if properly spaced. Therefore, he planted the cedar trees 4 feet apart initially, but thinned them later to 8 feet. The wider spacing was observed to allow for better root development and consequently better ability to withstand strong wind. The wider spacing also apparently helped prevent infections of the cedar-apple rust a fungus disease that can affect red cedar.

Fig. 1. Looking north along the western edge of the grove.

Fig. 2. A single-row mixture of topped slash pine and red cedar trees planted in 1985.

Fig. 3. Pine mulch in the windbreak row.

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Case Study III – A Citrus Grove on the Ridge near Minneola, Lake County

A local grower after long observation noted that frosts generally did not occur under pine trees and that their root systems did not appear to interfere with citrus tree development. Therefore, a small grove of Fallglo trees was planted in 1989. Slash pine trees spaced 25 x 25 feet were planted at the same time. Four Fallglo trees were planted in a square between the pine trees in each North-South row. The grove is unirrigated and currently is on an organic certified program.

Fig. 1. A 15-year-old organic Fallglo grove interplanted with slash pine trees.

Fig. 2. Another view of the grove shown in Fig. 1.

Fig. 3. Slash pine trees were planted 25 x 25 feet. They have survived and have grown well since 1989.

Fig. 4. The Fallglo trees were planted in groups of four between the pines in each row. The rootstocks were Palestine sweet line or rough lemon.

Case Study IV – Bamboo in a Citrus Grove

Bambusa ventricosa, a species of bamboo suitable for windbreaks, was planted primarily in perimeter locations in this Indian River grove near Vero Beach. The bamboo windbreaks shown below were initiated using single-stemmed plants in citripots and were a little more than one year old in October 2006. Each windbreak consists of a single row of plants set about 5 feet apart. The clumps are presently about 8 high with some individual shoots that are 10 feet high after regular fertigation by microsprinkler.

The owner recognizes that bamboo is relatively expensive to use in windbreaks, but makes the reasonable suggestion that it might be possible to divide the clumps when they are young (< 1 year) and use those plants to establish windbreaks elsewhere.

Fig. 1. General view of young *Bambusa ventricosa* planted as a windbreak for citrus. Notice that the plants are well branched from the ground to the top.

Fig. 2. Branching habit of *Bambusa ventricosa*. Notice the long slender culms (stems) and the excellent branching.

Fig. 3. Culm development and spread of the bamboo about one year after planting a single stemmed plant.

Fig. 4. An end view of *Bambusa ventricosa* plants about one year after planting as a windbreak around citrus.

Fig. 5. *Bambusa ventricosa* in a windbreak around citrus.