doubling in size, was not considered large enough for sale and therefore not claimed to have gained a grade.

This technique of heating plastic-covered structures results in excellent plant growth with a number of species and should have application for producers of ground covers, lining-out stock, and container grown stock. To determine whether this concept of heating and ventilating is economically feasible for nursery crops produced in plastic structures will be studied in research now in progress.

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RALPH SHUGERT: Thank you very much, Elton.

We will move right on to our next paper which is entitled "Growing Nursery Stock on Organic Soils", and to tell us about this will be Jan Jansen.

GROWING NURSERY STOCK ON ORGANIC SOILS

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Growing ornamental plants on organic soils is not something that is uniquely new, nor is it something that has been done only on the North American continent.

Nurseries growing ornamental crops on organic soils have long been established in the various areas of Europe, with perhaps the most well-known area being the Boskoop region in The Netherlands. In the United States, many of our cutflower production areas in Florida are on muck. Greenhouse forcing azaleas are also grown in Florida muck and are subsequently shipped throughout the country.

Most research and production work, however, seems to have been concentrated primarily on edible crops, principally vegetables. In recent years, work has been done with the growth of blueberries and with turfgrass production on organic soils. Work done with

ornamental shrubs and trees, however, has largely been limited to their use as windbreaks or hedgerows with limited information being available as to the possibility of commercial production of trees and shrubs on organic soils.

The Orange County mucklands are located in a rapidly spreading megalopolis only 50 miles from the center of New York City.

The lands totaling some 14,000 acres, more or less, have been primarily developed for vegetable crops. Onions are the primary crop totaling some 7,700 acres; lettuce is second, using 2,200 acres; celery third with 1,200 acres; and a rather recent major crop is the production of turfgrass sod, which has climbed to some 2,500 acres in the last 10 years.

Since onions, celery and lettuce have been the major commodities in recent years, we have seen large fluctuations in farm income and the creation of larger farms. The market continues to fluctuate and it was felt that possibly we ought to look at other crops to further diversify the marketing mix of the area.

What has been attempted in the last 2 years cannot be classified as pure research. All we have attempted is a feasibility study entitled, "Can We Economically and Competitively Produce Nursery Stock on the Orange County Muck?"

Working with a granular, fairly well disintegrated organic soil consisting primarily of residues of woody plants, both coniferous and deciduous, at least 30 feet deep; we set out to grow plants we thought might give us an indication of the chances of commercially growing nursery plants on these soils.

Soil tests on the plots indicate the major nutrient levels to be high. The soils tested pH 5.4 and consist of 85% organic matter as determined by loss on ignition. No lime or fertilizer were added, nor was any irrigation applied.

The following one-year liners were planted June 8, 1971:

Thuja occidentalis (globe)	*Forsythia intermedia*
Taxus cuspidata	*Rhododendron catawbiense*
Juniperus horizontalis	*Rhododendron (Azalea)*
Ligustrum obtusifolium	'Hino Crimson'
var. regelianum	*Ilex crenata* 'Convexa'

Visual observations of the plants throughout the growing season showed average or better than average growth of all plants except *Thuja, Taxus cuspidata* and *Ilex crenata* 'Convexa', which performed very poorly.

None of the plants were harvested in order to evaluate winter damage; in particular, we wished to observe the amount of heaving

damage the plants would undergo. As was expected, heaving damage was considerable on the shallow, fibrous-rooted plants. The deciduous plants and the *Juniperous horizontalis* wintered extremely well.

In June 1972, additional plots were planted. Again we used *Forsythia x intermedia, Ligustrum,* plus *Viburnum plicatum* var. *tomentosum* and *Euonymus alatus.* The plants were 1 year liners, cut back to 2 inches. At harvest in November, the forsythia numbered a minimum of 7 stems to a height of 30-36 inches, the privet numbered a minimum of 5 stems with a height of 30-36 inches, and the viburnum numbered a minimum of 4 stems with a height of 24-30 inches. All plants harvested were of saleable size.

It is our contention that the organic soils hold a considerable potential for growing certain genera of ornamental plants. The real potential may well lie in the production of bareroot deciduous shrubs where a 1 year liner can produce a saleable size plant in one growing season, be dug in fall either bareroot, or balled and burlapped, put into storage and be sold in late winter or early spring.

Of the evergreens, we evaluated juniper as being the most likely profitable crop of those tried. In two growing seasons, a 1 year liner can produce a 24 to 28 inch spread, compact, sheared *Juniperus horizontalis* 'Andorra'.

To date, our trials have consisted of a limited number of plants grown under the most adverse conditions. We think there is a potential even under such conditions. However, the potential should be even greater if good growing and management practices are incorporated.

In the future, we will be screening other plants and will incorporate good nursery practice in order to aid in the development of limited nursery production areas in the organic soils in our area.

JIM WELLS: I would like to ask about the rhododendrons; you indicated they did not do very well. I would have suspected they would have done very nicely on these soils. Would you please comment on this.

JAN JANSEN: The plants grew beautifully during the growing season, but primarily the problem was with the overwintering — there was considerable heaving. We put in some larger plants, 18-24 inches, and these suffered little overwintering damage, but the smaller ones heaved so badly that we just did not get much growth the second year.

RALPH SHUGERT: Thank you very much for the comments, Jan.