

# New Vegetable Crops for Greenhouses in the Southeastern United States

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## Abstract

Traditional greenhouse vegetable crops grown in the U.S. include tomato, pepper, Dutch-type cucumber, lettuce, and herbs. The percentage of the market value projection of these crops is in excess of 95%. Our work in a high-roof passive-ventilated plastic greenhouse in Florida has led to economic production levels for Beit Alpha cucumbers and Galia melons, two crops which originated in Israel. Galia muskmelon is a green-fleshed specialty melon with a yellow-netted exterior known for its sweet flavor and is highly desirable presently in the European market. We looked at three plantings over two seasons of various cultivars of Galia type melons. Average weight per fruit of superior varieties was in excess of 1 kg while average yields were 5.5 fruits per plant with Brix readings of 11.3°. Beit Alpha cucumbers are commonly grown in the Middle East. They are parthenocarpic, all flowers are female, and thus do not require pollination. Various Beit Alpha cucumber cultivars and Dutch type cultivars were grown over several production seasons in the greenhouse. Beit Alpha type cucumbers were successfully grown year-round under Florida's climatic conditions and offer an exciting new greenhouse crop for producers. Some cultivars produced in excess of 65 fruit over a 6-week harvest period. Several producers have already picked up information from these trials and have successfully marketed Beit Alpha cucumbers through regional retail outlets. Both of these crops have extremely high quality fruits, superior to existing melons and other types of cucumbers on the market including Dutch type cucumbers. Because of the prolific yields, the economics in growing these crops has been shown to be in favor of the producer. It is very important to keep in mind that although cultivar trials or variety trials that are being conducted may be for a single location, that they may in fact report important information that can be utilized by people in distant locations and, in fact, in other countries.

Greenhouse vegetable production has increased in Florida from approximately 120 hectares in 1996 (Hochmuth, 1996) to greater than 175 hectares in 2001 (Tyson et al., 2001). With the rapidly growing population in Florida, demands for resources such as land, water, and other natural resources are increasing. Much of the urban development occurs in year-round warm weather areas traditionally devoted to agricultural production (Gordon, 1998). Because of increased plant densities and longer growing seasons, greenhouse vegetable production can provide greater yields than field-grown crops (Eversole, 1999; Johnson, 1999a), thus, reducing the need for land, especially for crop rotation. Greenhouse vegetables are commonly grown in sterile media such as perlite. With the use of perlite, crop rotation or the traditional practice of soil fumigation with methyl bromide are not needed. Furthermore, protected agriculture structures or greenhouses provide a suitable environment to produce consistent, superior quality produce that brings a higher price at the market than field-grown produce (Johnson, 1999b).

As part of the Florida-Israeli Protected Agriculture Project, the Horticultural Sciences Department at the University of Florida and several local and Israeli agricultural companies are working together to promote and improve the greenhouse industry in the southeastern U.S. An important goal of the project is to adapt greenhouse technology from mild-winter climate countries and especially new commodities for production in Florida. Quite common to the European market are the 'Galia' muskmelon and the 'Beit

Alpha' cucumber. Both cultivars were developed in Israel and can have exceptional production and quality when produced in greenhouses or through protected ag cultivation.

The Galia melon is a green-fleshed muskmelon with a golden-yellow netted rind at maturity. Galia fruits have a unique aroma and sweet flavor, and show great promise as a specialty melon (Simon et al., 1993). Grown hydroponically in a protected ag structure, Galia fruit quality surpasses the quality of field-grown orange-flesh muskmelons because of its bold aroma and high sugar content, leading to higher market value.

'Galia' has become an identifiable trade-name in the European market (Karchi and Grovers, 1977). The cultivar can yield up to 50 t/ha of high-quality fruits with soluble solids readings between 13 and 15°Brix (Karchi, 2000; Karchi and Ayalon, 1977). Galia melon is well accepted in the European market and should be harvested at vine-ripe stage for peak flavor and aroma (Karchi, 1979), thus, potentially limiting long distance shipment to market. A lucrative market could be developed for Florida growers, by producing 'Galia' melon and targeting niche markets within the southeast U.S. and exporting to the eastern seaboard. Cultivar trials conducted at the Protected Ag Project ([www.hos.ufl.edu/protectedag](http://www.hos.ufl.edu/protectedag)) during 1999 and 2000, have shown that 'Galia', 'Gal-52', and 'Galar' would be best chosen for production in Florida based on high yields of 5 fruit per plant and high fruit quality (Table 1 and 2; Shaw et al., 2001). Furthermore, 'Galia' melon performs best under spring climate conditions of high heat and solar radiation. Fruit yields were lower in spring 1999 than spring 2000 due to excess vegetative growth that was not removed during pruning. Plants were properly pruned in fall 1999 and spring 2000.

The Beit Alpha cucumber is the primary cucumber grown in Israel and exported to Europe. The Beit Alpha cucumber originated on a Kibbutz in Israel and is now being distributed by several seed companies in the U.S. and Israel. Beit Alpha cucumbers are hybrids that are gynoeocious and parthenocarpic, thus they do not require pollination. The fruit is seedless and has a thin skin like a 'hothouse' or Dutch-type cucumber, but does not require plastic wrap to prevent dehydration after harvest. Fruit production is prolific for Beit Alpha cultivars. The plant characteristics include multiple fruit set at each node on the main stem and on the laterals. Depending on season, yields can be restricted to 10 harvests or less, or extended to more than 30 harvests. Beit Alpha cultivars grow well under extreme environmental conditions, especially high temperature (30-40°C), but also continue to produce well at low temperatures (10-15°C; Shaw et al., 2000).

Yields from Beit Alpha cultivars can be three times greater than that from common Dutch-type cultivars (Table 3). The cultivar 'Sarig' produces well regardless of season. Individual fruit are approximately 15 cm long and under 4 cm in diameter. In spring 1999, the average marketable fruit yield per plant was 65 fruits over 23 harvests (Shaw et al., 2000). The Beit Alpha cucumber fruit matures rapidly when environmental conditions are favorable (high solar radiation and warm temperatures). Fruit can be harvested daily or every other day depending on stage of maturity desired by the market. Consumer acceptance in the European market is for Beit Alpha cucumbers with approximately a 3-cm diameter; however, for some specialty culinary markets the flowers themselves are harvested.

Research is currently being conducted at the University of Florida Protected Ag Project on both Galia melon and Beit Alpha cucumber (see website <http://www.hos.ufl.edu/protectedag>). Research includes cultivar trials, plant density studies, and use of locally available pine bark as a media substitute for perlite. Furthermore, both crops can be successfully grown using biological control of pests and diseases, which in turn provides 'pesticide-free' product to a consumer conscience market. Galia muskmelon and Beit Alpha cucumber are new commodities to the U.S. and are well suited for greenhouse production in the Southeast.

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