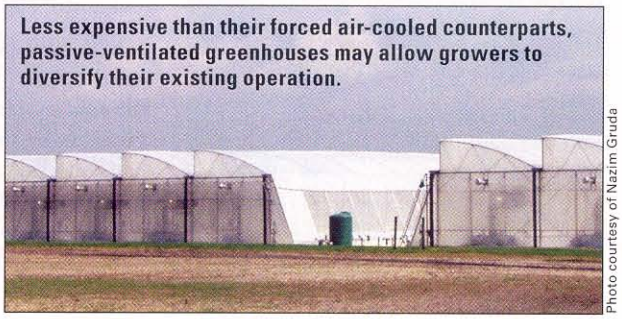
Growing The Perfect Strawberry

Early-season strawberry production in passive-ventilated greenhouses could be an ideal option for growers.



Less expensive than their forced air-cooled counterparts, passive-ventilated greenhouses may allow growers to diversify their existing operation.

Photo courtesy of Nazim Gruda

By Daniel J. Cantliffe and Ashwin V. Paranjpe

RESEARCHERS are looking at alternative ways of growing strawberries that can eliminate the dependence on methyl bromide, avoid excessive use of water for plant establishment and frost protection, reduce labor costs, and minimize crop protectant usage. Not only can growing strawberries in greenhouses accomplish these things, it also enables growers to cash in on the off-season market prices with increased early production during winter.

The Protected Agriculture Project at the University of Florida (www.hos.ufl.edu/protectedag), headed by Dr. Dan Cantliffe, chairman of the Horticultural Sciences Department, has been conducting research to develop a commercially viable and environmentally sound system to grow off-season strawberries in mild winter climates using passive-ventilated greenhouses. Passive-ventilated greenhouses have a high roof (26 to 30 feet high), are not equipped with expensive, energy dependent pad and fan systems for cooling, and are less expensive to purchase than their forced air-cooled counterparts.

The Right Environment

For strawberry production, heaters need to be used only on the coldest nights when temperatures are below freezing, but may not need to be used in more southern regions of the state such as Plant City (the leading strawberry area of Florida). During warm periods, ambient air temperature can be maintained by installing a shadenet, lowering the sidewalls, and opening the roof vents. The sidewalls and roof vents are fitted with insect screen that restricts the entry of lepidopteran pests and whiteflies and prevents bumblebees and beneficial insects from getting out.

Large scale greenhouse strawberry operations exist in the Netherlands, Belgium, Israel, the UK, Spain, Italy, and other areas of the world whose aim is to target the off-season market. Greenhouse strawberries in Florida are typically grown in PVC troughs filled with a soilless substrate such as pine bark and irrigated with drip tape.

Since berries hang down, the trough height can be adjusted so that the fruit can be kept at eye level and are easy to see. The back-breaking process of harvesting is made a lot easier and quicker, reducing labor costs.

Hanging bed-pack troughs manufactured by Polygal Plastic Industries in Is-

rael, have shown promising results. The troughs can be spaced 20 to 30 inches apart with more than three plants per linear foot, resulting in plant population densities as high as 98,000 plants per acre. Early yield from greenhouse-grown strawberries can be two to three times greater and the total yield can be three to four times greater than the total yield of field-grown strawberries in Florida.

Bug Patrol

Biological pest control is common and sometimes inevitable in protected strawberry cultivation since some chemicals are not labeled for use on greenhouse strawberries. When crop protectants are used, they may have an adverse effect on pollinators like bumblebees which are essential for obtaining a good berry shape, size, and fruit set under greenhouse conditions.

The major insect pests of greenhouse strawberries are two-spotted spider mites, aphids, and thrips. Biological control agents like *Aphidius colemani* (a tiny wasp which parasitizes aphids) and *Coleomegilla maculata* (the pink-spotted lady beetle that eats aphids) have shown promising results in controlling aphids. Predatory mites such as *Neoseuilus californicus* have been used effectively to control two-spotted spider mites, and a tiny insect called *Orius insidiosus* has been used to control thrips.

Using hanging bed-pack troughs allow growers to pack more plants in the greenhouse, increasing yields. Photo by Ashwin Paranjpe

The incidence of fungal pathogens like *Botrytis cineria*, which is commonly found in field-grown strawberries, is negligible in the greenhouse, especially under dry north-central Florida conditions. However, the incidence of powdery mildew can occur under these conditions and a biofungicide can be used for controlling this fungal disease.

Because strawberries need minimal heating during winter and thrive under Florida's mild winter conditions, off-season strawberry production in passive-ventilated greenhouses could be an ideal option for greenhouse growers and enable them to diversify their existing operation, better utilize the available greenhouse space during the winter months, and benefit from the high early-season market prices. GHI

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