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Greenhouse Vegetable Schedules for Virginia with Artificial Soil Mixes
(Includes possible vegetables-bedding plant combinations)

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(1) Fall Greenhouse Tomatoes followed by Spring Tomatoes. Seeds planted June 30, transplanted into greenhouse beds August 1. Later crops give very low yields in Virginia due to slower maturity rate under short days and lower light intensity of mid-winter. Also, the mid-winter heat costs often equal the income from mid-winter tomatoes.

Plants are topped around Thanksgiving, all marble size fruit removed and the remaining fruit is forced to mature, usually by December 20. Plants are removed from the greenhouse in late December. Beds are dried down, and revitalized by the addition of recommended nutrients according to soil test, and left in preparation for the spring tomato crop. Seeds for the spring tomato crop are planted the first week of December and, due to short days and low light levels, will be large enough for transplanting in February, and no later than March 1.

Do not force young transplants by overwatering or by keeping temperatures above 70^{o} (day) or 60^{o} (night). Give maximum light intensity daily for 12 hours only - long days will produce spindly seedlings. Remove spring tomato crops from the greenhouse in June or July whenever supply of local field tomatoes becomes highly competitive bringing low prices.

(2) Fall Greenhouse Tomatoes followed by Mid-Winter-Early Spring Bedding Vegetable Plants
Fall tomato crop handled as above and must ne in the greenhouse bed August 1 to attain sufficient yields by late December. Old tomato plants removed in late December, beds covered with snow fence type wood lattice, placed on troughs and supported by trough edges. Inserts, or cell-type containers placed in flats, and falts are filled with soil mix ahead of time so they are ready when needed. Direct-seed early season, or hardy vegetables, such as cabbage, broccoli, etc., 8 weeks before intended selling date. Direct-seed tender vegetables, such as tomato and pepper, six weeks ahead of intended selling date.

Water sparingly allowing plants to dry down near wilting point between waterings. Do not force plants or soft, spindling growth will result. Plants are removed for sale in season, and fence-lattice is rolled up and stored for use next year.

(3) Short Fall Greenhouse Tomatoes, Followed by English Forcing Cucumbers, Followed Spring Tomatoes. This sytem requires very good management ability, timing is critical, and this schedule should be attempted only by the experienced grower. Tomatoes are seeded June 15, transplanted into the greenhouse beds by July 20. A high density spacing is used with plants spaced 1 foot apart in the beds, trained to a single stem, and topped immediately after the fourth cluster of fruit is visible. Plants are removed on December 1, beds revitalized, and the English cucumbers, suggested variety Pandex

(tolerates cooler conditions), transplanted on December 5. Cucumber seed may be planted directly into jiffy pellets or peat-lite mix, 1 seed per pellet, on November 1. Greenhouse forcing cucumbers require special trellising, require no insect pollination, and must have night temperature of 60° and day temperature of 70° to realize a good yield and growth rate. This means a high mid-winter heat bill and this crop is not recommended for much of western Virginia or for sites receiving direct northerly winds which increase heat costs. The crop is removed in early March and the house is prepared for the main spring bedding plant business. For a spring tomato crop, cucumber plants are removed from the house in late February and tomatoes are transplanted into the beds, after revitalization of beds, on March 1. Tomato seeds for the spring crop must be planted in early December.

(4) Fall Greenhouse Forcing Cucumbers Followed by Spring Tomatoes or Bedding Plants (better in western Virginia than schedule No. 3). Cucumber seeds are started in jiffy pellets or peat cups filled with peat-lite mix on September 1 and transplanted into the beds on October 1 and house is covered immediately. Tight screens must be used on doors, over exhaust fan openings, over ventilating shutters, and any place where insects might enter. Bees or other insects must not be allowed in the greenhouse. They may pollinate the English forcing cucumbers resulting in unsalable gourd-like fruits. Day temperatures are kept in the 70's and night temperature in the 60's. The crop is removed from the greenhouse in late January or early February and the beds revitalized for the spring tomato crop or for the main spring bedding plant business. Tomatoes should be seeded in early December and placed in the greenhouse beds on March 1 for the spring crop. This system is highly recommmended for the colder winter climates of western Virginia and may be terminated earlier in the winter if desired. Suggested varieties include La Reine, Pandex, Toska, and Farbio.

(5) Suggested Fertilization Rates for Peat-lite Soilless Culture of Greenhouse Tomatoes and for Forcing Cucumbers. To 1 cu. yard of 1/2 premium grade of Canadian peat moss and 1/2 mix of #2 vermiculite add the following: (eleven bushels peat plus eleven bushels vermiculite)

10 lbs. of 5-10-5 fertilizer
10 lbs. of dolomitic limestone
2 lbs. of 20% super phosphate. Also 1½ tablespoon of chelated iron and 6 oz. fritten trace elements, FTE 503.

After plants are transplanted into the beds, a regular fertilization program must be started. Generally, water soluble fertilizers such as 20-20-20 with minor elements, at the rate of 1 lb. per 100 gal. of water, are used on a weekly basis. After the first crop of tomatoes and cucumbers has been completely harvested and the plants removed from the mix, it may be recharged or revitalized according to soil test results from tests made after the first crop is removed. (A heavy crop will remove more nutrients than a poor or light crop). 6 oz. of fritten trace elements will usually last through 2 crops, then need to be replaced by additional 6 oz. per cubic yard of mix.

The use of 3-4 lb. of slow release fertilizer per cu. yard such as 3-4 month 14-14-14 Osmocote is also highly recommended. For the spring crop delay liquid weekly feedings of the 20-20-20 until 1st fruit is visible on the vines. If no soil borne diseases are present, some growers have been getting 5-8 crops from the initial mix before steaming. Proper sterilization is achieved only with steam and it must be heated to 180°F. for a full hour.

For forcing cucumbers it is recommended that potassium nitrate (13-0-44) be substituted for 20-20-20 on alternate weeks. Cucumbers are heavy feeders of potash, requiring somewhat higher levels than tomatoes for best results, according to the experience of many growers.

Varieties and Yield of Greenhouse Tomatoes in Virginia

Michigan-Ohio Hybrid
Manapal
Tropic VF
Floradel
Tuckcross 533
Ohio W-R Strains
Vendor, Special Stokes Strain, fall crop only

Grower experience in Virginia has shown that tomato plants seeded in late June and transplanted into the greenhouse no later than August 1 will often attain marketable yields of 8-10 pounds of fruit per plant by the end of the profitable season ending in mid-December. Later planted crops are generally near-failures, seldom yielding above 4-5 pounds of marketable fruit per plant, and may not pay the heating costs.

The spring crop transplanted to the greenhouse in mid-February to March 1 will often go 14-16 pounds of marketable fruit per plant. Longer days, higher light intensity, and higher temperatures all favor the spring crop. Yield of greenhouse forcing cucumbers will often run 10-15 lbs. marketable fruit per plant or more, depending on management ability and length of season.

Practices to Conserve Fuel in the Production of Greenhouse Vegetables

With rapidly rising fuel costs, shortage of fuels, and with possible allocations and rationing, greenhouse vegetable growers are in for hard times. Some potential new growers are unable to find a source of fuel, since most suppliers are not able to take on new customers with present supplies.

Growers generally realize that site selection for the greenhouse can greatly affect use of fuel. Placing the greenhouse on a site sheltered from prevailing winter winds greatly reduces the wind chill factor on the surface of the greenhouse covering, and will markedly reduce heating costs. If your greenhouse does receive winter winds, the creation of a windbreak (which does not shade the house) is helpful in reducing heating bills. While living windbreaks, such as pines, are growing into effective wind conrrol size, a temporary windbreak behind the trees may be built of scrap wood slabs, 8 feet in length, put up vertically with 2 inch air spaces between slabs, to reduce wind blasts down to breezes. If the wooden slab "fence" is constructed tightly without air spaces, it will likely be blown down in heavy wind storms. It is also advisable to construct the windbreak 1--15 feet or so away from greenhouse to allow snow to settle out of the air coming through the 2 inch spaces between slabs, since your windbreak also becomes an effective snow fence. Also, should an occasional slab blow down it will not fall onto the greenhouse nor will the fence shade the greenhouse. Using locust posts about every 7 feet apart with 2 treated 2" x 4"s running horizontally between posts, gives the framework on which the slabs are vertically nailed.

Other special, energy conserving measures also include:

Using 2 layers of film on polyhouses separated by air inflation, using a very small, constantly-running blower fan. This can save 30% to 40% heat costs.

When possible especially on sunny days, do not raise your thermostats from night temperature up to day temperature. Let the rising sun bring up temperature naturally, Some crops, such as lettuce, are actually improved by this measure. Facing the greenhouse north-south will give it maximum exposure to sun-giving heat. Using an anti-fog, anti-drip spray coating on the innerside of the greenhouse covering will improve sunlight transmission and can improve plant growth at lower temperatures.

Keep houses as tight as possible - make certain all doors and ventilators fit tightly and do not allow cold air to seep in. However, do retain fresh air ventilation for your furnace.

Consider using an overhead polytube ventilation system to circulate inside air, especially at the top of each furnace heating cycle to prevent hot air collection at the top of the greenhouse (where plants cannot use it).

Now more important than ever, have some emergency heat system ready on a standby basis. Some growers keep a wood burning stove ready, with ventpipe-smokestack that will fit the present furnace outlet; others keep Salamander oil heaters handy, which also require no electricity. Either way, emergency heaters could keep you from short periods of otherwise freezing or below-freezing greenhouse temperatures. Use a thermalarm system wired to your home which is battery-powered and will sound the alarm if temperatures fall low when power is off or fuel is gone.

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