

STRAWBERRIES: A POTENTIAL CASH CROP IN THE TROPICS

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[I was asked in 1981 for help in evaluating the potential for strawberries as a cash crop in the Dominican Republic. The bulk of the following was written at that time after several phone calls.]

SUMMARY

Several scientists and one grower were contacted by telephone and asked about the potential of strawberries for the tropics. Their conversations are summarized.

The potential of strawberries (*Fragaria americana*) as a source of income for the small farmer has been clearly demonstrated at the Baptist mission in Haiti. They have never sold for less than \$1 per pint and they say the wealthier people drive up from the city to buy them.

The major limitation is that fresh, disease-free plants must be purchased at least every second year from the United States. This requires a capital investment on the part of the farmer and some risk that the plants may be dead upon arrival due to transportation foulups. A limiting geographical factor is that elevations which provide some relief from the heat are usually required.

It is important that day-neutral varieties be grown, because many strawberries only flower when the days are long.

In 1982 the Pan American Seed Company came out with a strawberry seed that produces good quality fruit. Small packets are available free from ECHO for testing. One can also get similar results by collecting one's own seed from the variety Douglas.

EXPERIENCES IN THE CARRIBEAN REGION

By far the most helpful and detailed information came from Dr. Frank Bishop, professor of biology at Goshen College. He has been working at the Baptist Mission in Haiti for some time, devising a system for strawberry production. This conversation is described in detail. The other conversations are also briefly summarized.

Dr. Bishop said that a dry area with an elevation of at least 3,000 feet (and up to 5,000 feet) must be chosen. Plantings should be made on a south or southwest slope for best results. There is not enough light on a north slope. Haitian soils are low in phosphorous (P) and potassium (K). By using a 1:2:2 fertilizer (the numbers are the ratio between nitrogen, phosphorous and potassium), good production with firm berries was obtained. The berries were not very sweet, however. Increasing K by using a 1:2:3 fertilizer resulted in a much sweeter berry which still had acceptable firmness.

Drip irrigation is the key to their berry production in Haiti. Plants of the variety 'Tioga' are set out in September to capitalize on the rains, which continue until December or perhaps end in November. Plants begin to produce during the dry season, which is roughly January 1 through March 15. Occasional drip irrigation keeps them producing well during this time. Rain or over-watering causes them to begin vegetative growth and fruit rot.

After they cease production, vegetative growth begins. Excellent runners are selected and transplanted to a nursery bed. These make new runners, which are then planted in the production bed the following September. After the second year new plants must be purchased from the States because of an accumulation of viral diseases.

Wealthier Haitians drive 15 miles into the mountains every day during the season, and are very glad to be able to get them at \$1 per pint. A lot of berries are stolen at night, which is one of the biggest problems with their production. The farmer must take special precautions to prevent this.

I asked why they were not grown on a wider scale if they were so profitable. Theft is one of the reasons. The risk of the investment in new plants from overseas every two years is too great for some. Haitians are used to multiple cropping, mixing in other vegetables with strawberries. This will not work. Finally, many will not do the necessary work. (I imagine it is difficult to keep motivated at working during the nine and a half months that they are not bearing but still very demanding of time).

They have tried to grow strawberries in the plains, but did not succeed because of the heat (and humidity?).

Dr. Bishop has heard that the Israelis have been so impressed with what they have done with strawberries that they want to do something with them in Haiti and the Dominican Republic. I have not heard since then whether this developed or not.

Dr. Shirley West at the University of Florida in Gainesville has done some private consulting with a private group that has grown strawberries in Haiti. He sent two varieties that were planted very near Port-au-Prince. There was some elevation but not very much. They flowered well and produced beautiful berries. The group that grew them are three individuals who hope to grow many acres, but political tensions delayed their plans. Many of the plants that were sent down were dead upon arrival due to delays in the loading dock by Eastern Airlines.

A friend who spent some time in the Dominican Republic, Dick Bragg, said that strawberries are being grown in Constanza. He does not know if they are being grown by small or large farmers, or by expatriates. From time to time "the strawberry man" would come to town, starting around July 1. He believes they are only grown at altitudes of around 2,000 feet or higher. In the spring of 1985, I visited a very productive, several acre strawberry farm in Jarabacoa in the Dominican Republic. Jose Postigo began it a year or so ago. Altitude is about 3000 ft.

Dr. Cesar Lopez told me that strawberries are being grown successfully just a very few feet above sea level. This is surprising. I believe this was in a very dry part of the Dominican Republic where humidity and disease would be much less of a problem.

Frances Williamson, a private grower in Florida, tried to grow strawberries in Costa Rica about 1976. He did not succeed, which he attributed to insufficient difference in day length at that latitude. He believes that since that time day-neutral varieties have been developed which would do better. He said you might have to use artificial lighting to make the days long enough for them to produce new plants, but he is not sure. The biggest problem he would expect from growing in hot regions would be poor fruit quality.

On a recent visit to the Quaker community of Monte Verde in Costa Rica I was told that strawberries do very well for them there, practically in the cloud forest and at an elevation of between 3,000 and 4,000 feet. They have very serious problems with bird damage to the fruit however.

Dr. Earl Albregts at the Agricultural Research Center in Dover, Florida gave most of the leads referred to above. He recommends one of the new day neutral varieties from California. He sent me two bulletins on strawberry production in Florida that ECHO can photocopy for development workers with special interest in the subject.

SUGGESTIONS FOR BEGINNING YOUR WORK WITH STRAWBERRIES

The first step in any new venture should always be to ask around to see if someone else has already tried. If they have, talk to them and learn as much as possible about success or failure and details of their techniques. If others have failed, you might still succeed if you can find some key thing to do differently or if you select just the right climate. In fact, the most profitable crop is the one that not everyone can grow. My comments are based on the assumption that you have not learned anything from local experience that would lead you otherwise.

The successful procedures used at the Baptist Mission in Haiti should be tested. We reported only the unique things that apply to Haiti, but there is a lot about general strawberry culture that will be the same. Read the attached two pages on growing strawberries from a Rodale Press book and any other material you may have available. Then adapt them as needed.

The primary emphasis should be on determining the suitability of those techniques for small-scale strawberry production, rather than on doing a variety of experiments to maximize production or profitability. If present technology offers an adequate place to begin, they can be fine-tuned later. If resources are available, try several varieties. There may be differences between them in resistance to disease or insects or nutrient deficiencies or climatic stresses. A combination of varieties might enable you to extend the production season also.

It will be very important to determine whether farmers will have to import new plants every few years. I would hesitate to talk farmers into growing berries until I either had tried them for a minimum of three years or it was clear that they could make enough money in one year to make it worthwhile. In Florida it is common practice to plow under the strawberry fields every summer and replant in the fall.

Finally, make sure you have studied the market and are sure that farmers will be able to sell all they can produce at a profit-making price before you get too many of them involved.

PLANTING MATERIALS

STRAWBERRY SEED

In a situation like that of the Baptist Mission where they must import new disease-free strawberries every couple years, it would be a great help if they could start plants from seed. It would also make it possible to send a packet in the regular mail to remote locations where it would be almost impossible for us to send live plants. Until recently

the only strawberry seeds that were available produced "alpine berries". These had exceptional taste but tiny fruits that did not have commercial potential.

The Pan American Seed Company introduced a seed that they claim produces excellent fruits. They call it the "sweetheart strawberry". I spoke with Dr. Alan Arrowsmith about them. They have oriented it toward the home market and Third World situations. With that in mind they chose the day-neutral breeding stock. Commercial growers would still use vegetatively produced plants because there will be greater uniformity of size and quality. He arranged through Burpee Seed Company to give us several packets of free seed for distribution to church workers overseas.

We have sent out several packets. The big majority of recipients report that they did not germinate. We have prepared detailed instructions for planting which must be carefully followed. We have had no problem getting high germination rates even in the summer. Several folks for whom they did germinate had them destroyed by leaf cutting ants. Some folks in Bolivia report that they successfully introduced strawberries to their area with our seed and they are now doing quite well.

Harold Johnson with Driscoll Strawberry Associates in California told us that you can gently blend Douglas strawberries in a blender with some water, then collect seeds that settle to the bottom, dry and plant. They give results similar to those of the Sweetheart variety.

We have grown both Sweetheart and Douglas from seed. We obtained quite vigorous plants that sent out runners till the area was filled with plants. The fruits were a nice but not huge size with good smell and taste. They were not the uniform size that is common with commercial berries. Presumably if viral buildup does not occur one could introduce berries this way, then select for uniformity and other characteristics when choosing transplants. Rather than several berries produced in a few weeks, these produce over several months but with fewer berries at any one time.

Instructions For Planting Strawberry Seeds. As you will see, this is not something with which the average farmer will likely be successful. If the development worker has success, someone could be especially trained and set up in the business of providing plants to his neighbors. We planted seeds in the greenhouse in August and had good germination in a little over a week in spite of the temperatures that must have been in the 90's high and 75 for a low. Prepare as good a seedbed as possible. We chose a tray about 1 foot by 2 feet with drainage holes and filled it to 1 or 1 1/2 inches deep with a mix of peat moss / perlite / vermiculite. This was watered with water that contained a soluble fertilizer. (That would not be necessary if you had a fine soil. Our mix has no nutrients in it). The seeds are so fine that it is difficult to assure that they will be spread evenly over the surface. To help with this problem, mix the seeds with a teaspoon of granulated sugar or fine sand. With your fingers sprinkle evenly over the surface, then with your hands pat gently over the entire surface to embed the seeds but not to cover them. Place in a location where they will receive light but never be in direct sun (we chose a place under a table in the greenhouse). The container must be kept constantly moist by daily watering. Do not fertilize again until the plants have been growing for a few weeks. Because the seeds are so tiny, they must be watered with a fine sprinkle if they are not to be washed away.

Transplant to a 6 pack or similar container when the seedlings have about 4 leaves. At this stage they will not be set back by the shock of transplanting. Work their roots loose with a small knife. Be sure to handle them only by the leaves. A broken leaf will not hurt the plant, but a damaged stem will kill it. Keep new transplants out of direct sunlight for a day or two, then gradually move them to better sun.

STRAWBERRY PLANTS

Do not bother with retail seed catalogs. I asked Mr. Jim Hoag at Burpee whether they would ship overseas. They do not because of problems they have had getting good plants delivered. He told me that much lower prices could be obtained in quantities of at least 1500 from the Van Burgendine company in Babylon, NY. The price for 100 plants in the 1984 Park seed catalog is \$22.50. The price at Van Burgendine in late 1981 was \$90 for 1500 if I recall correctly.

There is another advantage to Van Burgendine. The planting season in the States is quite likely different from yours. Plants can only be dug during certain months. This company stores some plants under refrigeration so they can ship any month. The only way to make sure they have enough of the variety you request, however, is if you place your order well ahead so they can be sure to store it for you.