

VERMONT SERIES – CROSSROAD FARM INTRODUCTION

Buddy: All right I'm here at Crossroad Farm in Post Mills, Vermont which is owned by Tim and Janet Taylor and Tim's going to give a quick background on how they got started and how they progressed to the point where they are today.

Tim: In 1980 I had finished law school in '78 and had been practicing for about two years and was very, very frustrated with what I considered to be kind of a boring indoor occupation and my wife had been a teacher at a daycare center and so we decided... We had this house and already 12 acres of land and we had a big garden and it just seemed like we'd try it, we'd try farming. There was a co-op already established in the area and there was an opportunity for us to immediately be able to have a market for our product. So we started with about two or three acres of lettuce and broccoli and just started doing it. And as the years, each year... of course we very quickly realized we needed to have a greenhouse and we built our first greenhouse which was a solar design which is a very high energy efficient house and then gradually we started to build these simpler, less expensive plastic houses and over the years we discovered that we needed to have a longer season if we were really were going to make a go of it. The first five years we weren't making any money and we needed a greater cash flow and the only way to do that was to extend our season. And with the season extension we discovered we had all this greenhouse space. Another way to increase our cash flow was to bring bedding plants into the business and so now we grow about three to four hundred varieties of bedding plants.

Buddy: So Tim for the greenhouse portion of your business at Crossroad Farm could you give us a breakdown of sort of the markets where you sell and what proportion of the different products make up your market?

Tim: Well 20 percent of our gross sales is bedding plants and then about 15 percent are the greenhouse tomatoes and we market them, the bedding plants are mostly marketed here, probably about 80 to 90 percent. Folks come directly to the greenhouse and buy right out of the greenhouses. They love walking around the greenhouses, visiting. It's really quite an experience every spring to see these folks come. After 25 years it's like they're all one big family here and it's really, really wonderful. And then the tomatoes, about half of them are sold off the stand during the season which begins around June we'll start having tomatoes and runs 'til the end of October. And then the other half are sold locally to other stands and down at a farmers market in Orange, Vermont.

Buddy: You've mentioned you've been farming here for 25 years. For our students that are in warmer climates, what's the coldest temperature you remember in those 25 years?

Tim: Well we've seen the temperature thermometer dip to minus 30, just barely touch 30 below zero but fortunately we're not growing. The greenhouses aren't open at that time, thank goodness. But we have seen June frost as late as June 15th. I've actually seen a light bit of frost on the strawberries in July, nothing to do any damage. And then we had a Mother's Day in May not, two years ago I believe in 2002 where it actually snowed. So

we can have anything for weather here at any time of the year. As an example of how cold it got, just last year when we started this plastic greenhouse up in March we'd brought our first plants in and it dropped below what the actual Modine® heater was capable of heating and our alarm went off in our bedroom. We came running out here and saw that it was dropping into the high 30s and it was about 10 below zero out. So we started running our plants back into the house, taking them and just running them back into our house and in the course of doing that some of them flash froze and that was around the fifth of March and it was 10 below zero.

Buddy: All right Tim so now I guess we'll take a quick look around the Crossroad Farm greenhouse operation and you'll give us some highlights on structures and some of your production practices.

VERMONT SERIES – LIFE CYCLE

Tim: At Crossroads Farm we like to grow a six week old transplant that we put in the ground and this one right in front of me is four weeks old now. The plant is germinated in a pretty conventional way using a propagating mat. The temperature would be about seventy-five to eighty degrees after they've germinated and we've pricked them off in about, they'll grow in their little seed trays in about two weeks. Then we put them in an 806 or in a 606 and grow them in there for two weeks. And then they go into a four-inch pot for two weeks. So, basically it's a six week growth pattern. The first two weeks of their growth and sometimes a third week they'll be under, will have extra light. Will get about sixteen hours worth of light. We'll use a high sodium vapor light. And we use that in all of our bedding plant production to hasten flowering. And after that they come over. After their six weeks, we plant them directly in the ground. In this case they go about fourteen inches apart in double rows. In a ninety-six foot house that comes out to be about seventy-two plants per row, with about eight rows. So somewhere around five hundred sixty, seventy plants to the house. Again, we mentioned earlier about the soil temperature, we want that to be up between sixty-five and seventy degrees. This particular plant at the stage it's still in it's 606 we will use a plant shield that we will water in, which is a *Trichoderma* fungus which will fight any root rot diseases *Rhizoctonia*, *Pythium*, *Phytophthora*, I believe, *Fusarium*, and a number of others. After they have been planted we use a string system that will string the plants. We use conventional clips. Later, as the trusses come out, we will use a plastic truss support and we'll grab some of those if you want to see what they look like later. We will prune usually the first cluster to about four blossoms and then the second one to four too. Because we want the largest root we can get. We do not drop and run our plants along the ground. Usually we go for about seven or eight trusses and then moving on to another house. So, we'll plant ten crops of tomatoes in the course of our season. Beginning with our first one around March fifteenth to the twenty-first and we'll plant every two to three weeks after that until the end of June.

VERMONT SERIES – PLANT NUTRITION

Buddy: We are here in one of Tim Taylor's tomato production greenhouses and he's going to tell us a little bit about his strategy for plant nutrition.

Tim: Well, it's actually relatively simple. Here it is, right here. This house we've been growing now in the soil for twenty years. We started off with a very sandy soil here and every year we bring in about four to six inches of semi-composted manure, cow manure and just add it to the soil. Now it provides about eighty-five, ninety percent of the nutrients we need to grow the crop. And it buffers us so that we don't have to monitor the nutrition on a daily basis in the same way that you might with some sort of hydroponic system. This is essentially like growing in the field but only a little more ideal because the organic level of the soil here are about twenty percent. What we will do is we'll read the plants. As they're growing, as long as I see about six inches below the top of the plant that it's about half inches thick once it's started growing, once it's a foot to two feet high, I'm pretty happy with their growth at that point. I feel that I have a good balance between nitrogen and potassium. I should say that we try to optimize, maximize rather, the number of pounds that we can get out of here. We take an approach to tomato growing where we believe the best quality fruit is in the first four to five trusses. And then after that we want to go on to another tomato house. And, so, we do successive planting and we do, in all, ten different plantings of tomatoes in these greenhouses.

Buddy: So, we're here in the first week of March. In some types of tomato cultural systems you would have already planted by now. And you might have plants growing for almost a full year. How come you're waiting a little bit longer to plant? What's your reason behind that?

Tim: Well, as a sustainable farm, we don't believe that tomato production in Vermont is something that is environmentally sound probably at all, except during the peak summer months, but if you're going to try to extend your season you've got to find some compromise with the weather. And so we aim to plant on March 21st around the first day of spring when the sun has actually crossed the equator and is starting to work with us a little bit.

VERMONT SERIES – PEST CONTROL

Buddy: Tim, please tell us a little bit about your IPM practices here at Crossroad Farm.

Tim: Well, they are limited because we haven't had too many problems over the years. The tomato greenhouses, all the greenhouses are frozen during the winter. I mean that one of the virtues of being in such a cold climate. We'll get down to, as we mentioned, ten to twenty below every season. Also, we can come out and we'll do this occasionally and actually heat the house up in the middle of the winter and bring, make something

come alive. A pest come alive and then let it get frozen again. So we have this constant heating and freezing that goes on all winter long. And as a result a lot of the pests just get driven off and killed. We have not ever sprayed in any of the tomato greenhouses any kind of fungicide, insecticide, or herbicide for that matter. They're just not a problem. The sides we employ very careful cultural practices where we are just constantly exchanging the air in the greenhouses, a lot of ventilation. So, yes, we do have some incidences of *Botritis* but once again I want to stress that we are not ever trying to get the optimum crop we can get out of that. It's always, life is sort of a series of compromises and it's true inside the greenhouse, I think, too, in the production. You want to get the highest quality of fruit off but you don't have to try to extend the season, a particular crop well beyond what its normal growth cycle is. So, on the other hand, in our bedding plant greenhouses we will use some IPM practices like bringing in beneficial insects for some problems. But that usually tends to only be a problem brought in from other greenhouse when we buy in some geraniums or some other plants that bring in maybe some aphids. So we will bring some beneficial insects for those.

VERMONT SERIES – STRUCTURE

Buddy: So, Tim, why don't you tell us a little bit about the structure of this particular greenhouse? You can sort of start with the baseboards and work your way up and the framing materials and the type of glazing material you use.

Tim: Ok. Well, this house is about twenty years old. Very simple construction, I should say that we try to keep it as low cost as possible because since we're not operating a full year round, in fact we only, most of our houses are in operation about six months out of the year it doesn't behoove us to have fancy, expensive glazing and just a general structure that's real expensive. We try to keep it as inexpensive as possible. So, we have a galvanized structure, pipe structure. The pipes are about two inches in diameter. They're driven into the ground about 3 feet down. Attached to them, in this particular house, is not even pressure-treated wood. This is actually still rough board hemlock that we grow here in Vermont. Native hemlock, very rot resistant and then up about five feet we have a shoulder board which is pressure treated, that hemlock had since rotted. And the reason we have that is because we will roll these sides up in the summer. We try to reduce our costs as much as possible and that includes in summertime or springtime, rolling up the sides and turning off our fans, and doing a passive ventilation. Now, we have, basically here the plastic you find in here is a little sophisticated in the sense that is a four-year poly now it has two layers with air blowing into it to create a certain amount of dead air space for a little insulation. The layer that's on the inside of it has an infrared transmission to try to keep the heat inside. It's treated with chemicals to keep the heat inside. It also has an anti-condensation treatment, so it won't just drip straight down. It runs off the sides. And then the outside has another layer of six-mil poly which is more conventional.

Buddy: So, could you tell us a little about the environmental controls you have? For temperature control in the greenhouse?

Tim: This particular house has two heaters. They are propane. Which is what we've always chosen to use, primarily because they're mobile, simple, easy to handle. Tanks can be brought in, brought out. Just the houses are all built over a twenty, twenty-five year period. And so, they're not scattered around but as in most complexes they were not designed to all to be here. So you add one tank one year and one tank another year and that kind of thing. But we have two propane heaters and then we use horizontal airflow fans. And we have four of those placed in a proper position to maximize the airflow around the house. In this direction, just like this and they work, they're fantastic. The heat down at this end and down at that end will only vary within a couple of degrees. Now, as far as ventilation, we have two fans at the east end and vents down at this end. But the first stage, there are three stages of ventilation. The first stage, the fan comes on at this end and there is a tube down the center here. This is not used for heating this is an inexpensive form of a fan jet. It sucks the air down the tube and then dumps it down into the house and then the horizontal air flow mixes that cold air up. And that we use for cold weather ventilation. That'll be used a large part of the month of March and winter cooling in the month of April.

Buddy: A moment ago you were telling us about some of the environmental controls in this greenhouse and there is one more that we haven't talked about yet and that is the use of in-ground heat. If you could tell us a little bit about that.

Tim: Well, this house gets planted in mid March, anywhere from the Ides of March when ol' Julius Caesar bit the bullet to the first day of Spring. So somewhere from the fifteenth of March to the twenty-first. And the ground in here is about forty degrees and it needs to be sixty to seventy degrees for growing the tomatoes. We devised a very simple little system for heating the soil and it just involves a little conventional hot water heater. Fifty gallons, that's used in most homes. And we heat the water here, then use this circulating pump, which has several thermometers to be able to read the different temperatures coming and going. And it comes out, circulates out through here, comes down the pipes, and enters the soil right down here. And the pipe that's in the soil which is about two feet down. It's just regular black polyethylene pipe. It's three quarter inches, this is the header which is a little bigger and it just circulates up and down. In this particular house there's four beds that are ninety-six feet long and it goes back and forth circulating this hot water. At the start we'll have the hot water at about a hundred degrees and the soil will be about forty degrees and the returning, the water will go out say at a hundred degrees to start with but very quickly, it starts to, the heater can't keep up with and in the soil it actually drops the temperature of the hot water heater. So it eventually it starts off comes back at fifty degrees. The first time it comes back maybe at ninety degrees, then eighty degrees, then seventy degrees until it drops, then eventually after about three or four days it starts to build back up again. So now it's starting to be forty-five and fifty, fifty-five, sixty. And then within about five days it's up to about seventy degrees in here in the soil.

Tim: O.K. Well, we are looking at the first greenhouse that we built right here. And this a very different kind of structure from say the plastic houses behind us, behind me here. This was built 1981. It was back in the time when we were extremely conscious of the use of fossil fuels and how expensive it was to burn fossil fuels. This is built, these are, the glass itself thermopane, they were sliding glass doors that we fixed in place. The, all around the side of it, it's buried with blue board, fiberglass board, B-board it's called. And then it has six inches of fiberglass in the walls on the north siding, on the east and on the west walls, and again six inches of fiberglass in the ceiling. Looks a little bit like a sugar house, actually. It was a passive solar house so that before we put any kind of heat into it we put fifty-gallon drums of water in the back wall and they would absorb the sun's rays and then protect the greenhouse from freezing. And then it was ventilated from the sun by opening up the vents in the side, and letting the air come in and then go up. There are vents that come down at the top. It'll allow the air to just go right up through like a chimney. Now, a few, a number of years later we got a little bit lazy and decided to put in a mechanical fan which we just heard. And a little Modine® heater to make life a little easier for ourselves. But this house, which is forty feet by twenty feet and here's Kobey here, here's our dog. Our Bernese, he loves it being nice and cold out. When it was forty foot by twenty-foot house and it can be ten to fifteen below zero it will not freeze inside the greenhouse. Even if it doesn't have heat at all, it will not freeze. It will stay above thirty-two degrees. Now we want to heat it up to about sixty degrees. So, the average cost with temperatures down around ten below zero every night, maybe down to zero will run about ten or fifteen dollars a week. So, it is extremely efficient, energy-efficient house.

VERMONT SERIES – HEATER ISSUES

Buddy: Tim, you mentioned that the heater in this particular greenhouse is undersized or under-capacity for some of the early spring cold weather that is possible in Vermont. How did that happen to come to be?

Tim: Well, originally the house was only 48 feet long and then we expanded it, we had a little extra space and so we wanted to take advantage of it so we expanded it to 72 feet and of course we didn't change the size of the heater. At the same time we just had an exceptionally cold night and for 15 or 20 years the temperatures in March hadn't been that cold and we'd been fine but that particular night really revealed how undersized and under-engineered we were.

VERMONT – LABOR ISSUES

Tim: I guess in the last few years we've been hiring as many as 20 people, all part-time. We don't have any full-time employees. Usually we'd have out of say 20 people maybe five or six of those would be what you'd call adults, being somewhere in the neighborhood of early 20s to upwards to 50 or 60 years old but usually most of them are 25 to 30. And then we have about 15 high school employees and then the last three years

we've had a student that comes through a program called Global Outreach who comes from a foreign country. We've had a Lithuanian, a Bulgarian, and someone's coming this year from Moldova. Is that right? And they come and live with us for six months and they are usually in their early 20s.

Janet: Yes. Actually we have some full-time but not year round employees because our season for hiring usually begins in March and most people are done by October if not sooner and then we have sometimes people on either side a little bit for some of the greenhouse building or kinds of project-oriented labor. And during the year for harvesting is when we have, during the harvest season is when we have the most number of employees. And it works out well with the college and high school students because they have the same schedule as the bulk of our work.

Tim: So usually around March 1st our first employee will join us and then we'll pick up another couple in April. Sometimes it will be, in the case of this year, we'll have a couple of high school students who will come sometimes during the week for a few of hours and then the bulk of them will come when the school year gets out. And the college kids come in mid-May which is critical because we're putting all the crops out and doing a lot of row covering.

Janet: We look forward to having people come who maybe start as a junior in high school, maybe as a sophomore in high school and having learned a year or two of what we want from the program, then continuing through their college years. And that's happened to us a lot where people have come back year after year. And of course that's ideal for us because we're not re-teaching everybody everything and those students become teachers for the next generation that comes through. And so when it's ideally flowing, there's always people at several different levels of experience at the same time and learning from each other because we do some of the teaching and count on some of our employees to do the other.

Tim: You know I don't understand where high school kids got this wrap that they don't want to work because our experience is that not only do they want to work but they are very good workers. We have an interview process and we sit down with everyone and go over and explain to them exactly how hard the work is and we always analogize it to like climbing some of the mountains around here on a hot, humid day and that we work in rain or sun. It could be 80, 90 degrees out or it could be a monsoon but we've got to keep working. And the kids sort of who've worked for us before they talk to the kids, the new candidates, because they are often at the high school during the school year talking to them. And it's almost self-policing because those kids want to make sure that the kids who apply for the job here are going to be really good or they'll discourage them from actually applying. But no we like to hire them usually ninth or tenth grade and then the first two years they're really are just learning. They can be quite good but by juniors and seniors they're often teaching say first-year college kids that come to work for us or maybe older. We've had high school kids teaching adults in their 30s because these high school kids have worked already four summers and they know more than someone coming in who's in their first year who's just in their 30s.

Janet: And a lot of them are very willing to take on responsibility and it's always fun to see a change when they've started to understand what's going in the farm and let us know what's happening and keep us abreast of changes that are going on whether it's in the greenhouse or in the field and pick up on things they need to know. And we have some individuals that have been in charge of different greenhouses, particularly in the tomato production area. And that's always something we look for in our employees is people that are willing to take certain amounts of responsibility.

Tim: We're not the largest tomato grower in the world but we do grow 20, 25 thousand pounds a year and the last three or four seasons they've been chiefly grown, obviously by us, but by this one single high school student that comes. He'll start coming to work in another week or so, about the middle of March to help us plant them and he'll see them through. Unfortunately he goes to college next year and we'll be forced to find someone else.

VERMONT SERIES – FINAL COMMENTS

Janet: I think the challenge that we have now running the greenhouse is probably different than it would have been when we started. We are sort of in a place where we're always thinking about endurance and stamina. And perhaps years ago it might have been the learning curve or....

Tim: Yeah just trying to...I mean at the very beginning we came into this not knowing a single thing. We'd both been trained in other fields and so we just scrambled around trying to learn from other growers as much as we could and attending every conference. And with what we do being more than just a greenhouse business but being vegetable growers as well and each crop having its own educational level about it. Now we sort of know what we're doing, we have our markets but now I guess as we've gotten older we need to get psyched up for you know our 12 hour days, 7 days a week to carry us from March 1st to the end of October.

Janet: Weather is always an ongoing challenge.

Tim: Weather is. I mean... but of course having done it for 25 years in Vermont you're always dealing with the weather and the weather can affect a greenhouse too. We've had greenhouses flip over on us when they've been rolled up and we've had little mini-tornadoes come through and heaters fail and you've got to get out...well here goes the heater right now...and you have to get out other emergency heaters to keep it going and that kind of thing. But I'd say right now it's really just the endurance. We sort of have our markets and know what to grow and how to grow it and just keeping it all going.

Well I guess the biggest thing that I'd still like to learn is because we do so many different things, and grow so many different crops and so many different varieties of

flowers and tomatoes for instance in the greenhouse is just needing to constantly keep up with and learn more about each individual crop because we never get to be an expert about any one of them so I'd say that to me is this constant needing to learn about all different kinds of things.

Janet: And that's the fun of it too.

Tim: Where do we see our business going in the next 10 years?

Janet: Slow, steady growth as far as what we're doing. There's always a change about exact crops that we're doing and that's part of what we enjoy is we can roll with the changes in the demand and what the consumer wants. And I think that 10 years from now we might be in a different place in that we might be taking on a partner or having someone take over the farm from us in that period of time but getting there I just say slow, steady growth.

Tim: Yah with hopefully a strong teaching component in that. We're really enjoying bring students in and starting to teach them what little bit we know and that kind of thing.

Janet: Computers. We definitely use computers in the office and we definitely do not use computers in the greenhouse. So our computer use has more to do with our planning stages and different projections and ordering and those kinds of systems but for our greenhouses they're so basic that we're not involving computers at this time.

Tim: Yah they're used you know in crop productions, use of spreadsheets with formulas and that kind of thing. They've definitely, have certainly increased our production greatly and our ability to get things done in a quicker fashion but actually haven't been really necessary in this operation because so much of it is hands on. We're small enough that we're able to stay on top of it personally.

Janet: Our greenhouses are so diverse in what is in each greenhouse it's hard to manage it. We take advantage actually of the fact that we have multiple small greenhouses so that we can actually use the different environments for different crops.

Most of our employees are not schooled in horticulture or in farming or agriculture so when I think about what a college course would need to teach to help students it has to do more with the kind of position that we're in as managers of a small farm. And what I would have wanted to study when I was in school would be, because we're a diverse operation, a lot of parts of what we're doing whether it's soil science or horticulture, some of the accounting and planning kinds of things that we need.

Tim: I think it's like any professional training, like a doctor or nurse. You've got to get out in the environment. You've got to get in the work place and actually do an internship and work with in our case greenhouse folks or farmers, vegetable farmers and grow the things and get hands-on experience. And I don't think you can do that just in a

university. I think you can teach horticulture and you can teach agronomy and that's all well and good but ultimately you've got to get out. So I guess any college program I think would include a requirement for an internship and hopefully some mutual feedback between the professors and the farmers, the greenhouse growers.

Janet: My advice?

Tim: Well my advice I know would be that is bigger isn't always best. We've enjoyed living in Vermont, which is one of the smallest states. We've enjoyed having what we think is a very productive small farm, extremely diverse. What is a lot of fun about what we do is that it's always changing. The weather, the seasons change. What we grow changes. What we're doing changes. Like we're in March now and tomorrow I'll be sowing peppers and we'll sow that one other time and then we'll put that seed away and not see it again for a whole other year. So I guess my advice to a student coming out is while you might go to work for a big company to get experience don't be afraid to try to start your own business on a small scale and find your niche where you don't always have to be absolutely the most efficient and as long as you carve out the market and grow a high quality product people will buy it and be willing to pay a little more for it.

Janet: Focus on quality when you're doing your work and I think the rest will come.