

THE CULTIVATION OF TAXUS IN FRAME AND FIELD

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About the third week in May we are generally ready for planting out our well hardened taxus cuttings, also by this time all danger of frost is past.

Preparing of the soil is, of course, highly important, we at the Rhode Island Nurseries, fertilize our soil at the propagation grounds with one year old cow manure which we apply quite generously. We rotohoe the manure in with a 60" hoe with tractor and power take off, and go over this ground three times with this Rotohoe so that the manure is thoroughly mixed with the soil to a depth of at least 12". After this we proceed to erect temporary frames, 8 or 10" boards are used, and the frames are 5 ft. 10 inches wide as we use 6 foot shades. As soon as a couple of the frames are up one of our men follows this up by tilling the bed again with a 20 inch Rotohoe and of course as soon as one bed is ready two men can start planting. I say two men because our beds are only an average of 90 feet long, but, of course, more men are put to planting as the beds are ready for them.

The cuttings are lifted out of the propagating bench, the roots are trimmed back to about 3 to 4 inches to insure a heavy root system later on and to facilitate planting. Cuttings are placed in boxes 10 x 10 x 16 inches and thoroughly soaked. The reason for such small and tight boxes is that the men can handle them easily and the roots won't dry out.

We kneel right inside the frame when planting, each man having a knee pad made of burlap and stuffed with hay. A trowel is used, one man does the leading of each row, planting about half the row and then the other man takes over and finishes. We do not use a planting board as this, in our estimation, is time wasted. Soon a man is able to gauge the proper space, which we think should be 4 x 5. We all know that plants are not proud as long as they are well planted, plenty deep, as the soil will settle quite a bit after the thorough soil preparation. We generally plant the upright varieties such as *bicksi*, *batfield*, etc. closer than the spreading types as the land with us at the propagation grounds is at a premium.

We keep our taxus shaded for two full growing seasons as we are plagued with a blight which attacks the plants at the surface of the ground and really will do a good job in wiping them out, it takes the top first, that is why we plant them between boards so no direct sun can strike them at any time.

The weeding is done by hand with a three pronged short handled scratcher used to loosen up the soil. Weeds at the Rhode Island Nurseries are considered "Contraband" so we try to keep the place as clean as humanly possible. This also can be done by soil treatment, as we all know, but as our propagating plant is always crowded and there are always plants or seeds waiting to be placed, we just cannot spare the time and room to wait until the gasses have worked out so we have not applied them as yet. Also certain mulches can be used to good advantage to facilitate the weed problem sugar cane etc.

At the end of the first year our taxus are trimmed. This is done early in the spring to provide for a strong liner, and as mentioned before, the shades are kept on until the end of the second growing season. All the shades and

boards are removed in the middle of September in order to enter the winter with a well hardened product. The following Spring these plants are transplanted to the fields which were prepared for two years to receive them if evergreens were grown in these particular fields. If shrubs were grown, sometimes one year of preparation is sufficient.

The preparation of the soil is as follows: One crop of winter rye and two crops of buckwheat per year and a total of 15 cords of cow manure per acre. The manure is purchased over an area of about 25 miles. In other words, if a farmer is willing to sell, the Rhode Island Nurseries is willing to buy! A tractor with front end loader and three dump trucks are used for transportation. The manure is dumped along the edge of the field and from there it is spread, usually by tractor drawn manure spreaders. We usually cover the field three times, which gives about the amount we believe necessary to grow a good plant, or to provide a good finished product.

Our two year cuttings are planted on 2-1/2 foot rows and 10 inches in the line. Before they are planted all the roots and tops are trimmed which, of course, again provides a strong root system and a compact top.

We follow the following procedure in planting: The field is staked out on each end with pointed wooden stakes 30 inches long and 30 inches apart, driven into the ground with a sledge hammer so that the ropes can be tied and stretched tight on them. Usually two lines are used and a certain number of rows left open, depending on the amount of plants of this certain variety to be planted. Working in a rotating manner we start on one end of the field. If it is a large variety, we leave a certain amount of rows open and you start that same variety say 20 lines hence and you keep on going up and coming down with the same variety until you meet. If the varieties are small two varieties are planted at the same time. The foreman always knows about how many plants there are of each kind so he can judge how many lines to keep open for each variety. They are planted in furrows opened by plow, and in our case, drawn by mules. One man handles the spade and one sets the plants in. The man with the spade sees to it that the spot where the plant is placed is deep enough and shovels some soil on the roots which the planter tramps down as he puts in the next plant. We have several teams like that on the same line, of course. Behind the planters comes the Cub tractor with a scraper on an angle between front and rear wheels, on the right side, to fill in the rest of the trench or furrow.

For convenience in transporting plants to the fields we use planting boxes 15" x 19" x 4 ft. in which the plants are packed, roots well soaked, and placed at intervals down the lines. This keeps walking to replenish the planter to a minimum. After the field has been planted the plants are tramped down to insure that no air pockets are allowed to remain. This job finished, the whole block is cultivated to take advantage of any welcome rain, and if not welcome, it loosens the ground just the same.

The weeds are kept down by cultivation and long handled scratchers, no hoes are used anymore. This is to prevent scraping of or injuring the plants. The following winter these plants are trimmed. The following year they are kept free of weeds the same way and trimmed again in July. In September of the second year they are transplanted for the last time, for at least three years, which will give us the desired 18-30" or a solid 18-24" plant.

The second transplanting is done in the same manner as described before, except that they are spaced 30 x 30". This allows for cross cultivation. The field is marked out for the check row planting, the furrows are plowed to the inside of each row to prevent the cross markings being covered.

During these three years the plants are trimmed in the winter time and the last year before maturing, with a good growing season, the spreaders are lightly trimmed with the knife in July.

As you can see it takes us seven years to produce an 18-24" taxus but at the Rhode Island Nurseries we think we have grown, with the help of nature, as good a taxus as could be grown, uniform, symmetrical and compact. Good enough so that they can be sold row run, except for a few small ones and even these so called "Culls" sell readily as they have a good solid body of at least 12" x 15". In other words the plants are so well grown that, by the time the shipping season is ended, the fields are absolutely cleared off and ready to be prepared for receiving the next crop.

I hope I have convinced you that we have grown a good top and this, of course, goes hand in hand with a good root system. Naturally we have to take care of this also, and with some of the mean spoilers in that respect we have up our way, we have to do something about that. I refer of course to the insect pests.

One of the more serious pests affecting taxus with us has been the Black Vine Weevil which, if left uncontrolled, can cause untold damage in the taxus plantings.

Our first experience with this pest was back in the 20's before the modern insecticides were on the market. The old standby at that time was arsenate of lead but this was found to be merely a repellent to this particular insect. We did find, however that they were very partial to magnesium arsenate and after a year of extensive and intensive spraying we found that we were able to obtain a 100% control. A few years ago magnesium was taken off the market but by that time we had DDT which, while very effective, always presented the problem of a mite build up.

We are now using Chlordane and think this is as good as anything available; and gives a good residual deposit. It has been our experience, that spraying for control of the adult weevil is the only way in which control can be obtained. Grub proofing the soil for the larvae is very ineffectual. It is of course, the larvae feeding on the roots that causes the damage. But our approach has been that killing off the adult before egg laying takes place, is the simplest way to eliminate the larvae.

The Weevil starts emerging from the soil with us about the middle of June, depending on the weather, and after feeding for two or three weeks, start laying their eggs in the soil. During this two week period we spray all of our taxus and on the more susceptible varieties we try to make two applications. On or about the 1st of July we feel that egg laying has started and any further spraying is useless. Naturally the date of emergence and egg laying will vary in different localities, due to weather, and only through close observation can the date be determined.

It is of particular importance that an effort be made to make a very thorough coverage of the bottom branches and also the interior of each plant. With this in mind we find that the hydraulic sprayer gives much better re-

sults than the mist type machine. Merely as a preventive measure we have included the spraying of all of our taxus every year in our spray schedule and think it pays off in the long run.

We have been using Chlordane at the rate of 2 pounds per 100 gals. of water but Aldrin or Dieldrin has also been found to be very effective and no doubt some of the newer insecticides will be equally as good.

In the past two or three years scale in great numbers have been infesting our taxus and have proved most difficult to control. There are two species which work simultaneously, which in itself is of some help, in that spraying can be done for both at the same time.

These two scales are the Fletchers Scale, a dark brown hemispherical scale and the Pulvinaria scale, a white cottony egg mass. The life histories of both of these pests are similar and they both secrete a honey-dew which in turn grows a sooty mould and soon the plants appear black. If not controlled the small lice-like nymphs, if in sufficient numbers, devitalize the plant by sucking large amounts of juices leaving the plant yellow and weakened. For control it is necessary to kill the nymphs when they emerge from the egg masses and with us this means spraying the early part of July when they are most susceptible.

To date the only effective insecticide for the control of the Fletcherii is 1 quart of nicotine sulphate to 100 gallons of water with the addition of about 8 ounces of a spreader. The Pulvinaria is easily controlled with 2 pounds of DDT to 100 gallons of water.

The nicotine and DDT are compatible and one spraying should suffice but again it is very essential to make a very thorough coverage as the scale are usually found on the underside of the foliage and hard to get at unless a special effort is made to cover well. It is just this inaccessibility that makes these scale so troublesome. We hope that some of the newer insecticides will prove effective against these pests.

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MR. HANCOCK: Martin, I would like to ask whether it occurred to you that the browning is due to the sun in June? We had the same trouble and we took the same answer. We shaded two years. After introducing irrigation, the second year I found we eliminated it. One day I noticed we had lost some in the hottest corner of the ground. I examined them and they were burnt three-quarters of an inch. I pulled the plant up and it was absolutely perfect. It went on growing. In one or two June days, the sun was hitting the ground right at the surface, and the plant which was killed was one which had no branches at the surface line. The plant was not killed, if it had covering. I suggest that is not a disease but killing by sun-scorching in June.

MR. VAN HOF: We call it a blight. It is excessive heat, I suppose, that causes it. Keep the shades on, I tell you no irrigation will stop it.

MR. HANCOCK: It will if you start with a circular sprinkler at 10:00 o'clock in the morning before the sun becomes too hot. It is sun killing, I am sure.

MR. VAN HOF: All right, let it be sun killing. I will surrender on that. We licked it by accidentally leaving the shade on.

MR. VANDERBROOK: One of the new wrinkles that was advanced at our place was the thought we didn't need lath shades over these yews all the time, so the method was tried of keeping them shaded when they were first planted. This was the first year when they came out of the greenhouse, keeping them shaded until about the 15th of July, then take all the lath off. Strange as it may seem, we haven't had any burning. The lath were left off until the first of November and then we covered again.

MR. HILL: Martin, what measures have you found most effective against this serious defoliation of the cuspidata foliage?

MR. VAN HOF: A good question. You know we have for two years now had young lads from the University of Rhode Island work on that. I don't think they have come up with anything concrete.

MR. HILL: Have they assigned it to a pathological cause, a disease or have they said no, it is systemic, something in the plant, not enough water or its nutrition? Have they broken it down to that extent?

MR. VAN HOF: No, they have not.

MR. TED WOLF (Cleveland): I just had a little experience with *brevifolia*, trying to solve the problem, and was only partly successful; but taking the cuttings in December, early December, for a few years and have them all defoliate and get into real trouble. I did step the time up and found, in this section, taking the cuttings either late October or early in November at didn't rot and that you get a pretty good stand. They got rooted. Wh spoil at least came out with a pretty decent yield.

MODERATOR KEEN: There seem to be variations in *nana* or "*brevifolia*" strains. Some seem to hold their foliage and others in the same row will be defoliated, so there are some differences there.

MR. HILL: Perhaps a little further information of benefit. My question was to deal principally not with cuttings but more with the field culture of plants whereby we had some rather large plants which were well established. I don't think they were of your origin, I think they were of our own. In the summer of '53 and summer of '54 those plants displayed very definite defoliation along in early June when the plant would lose, in a period of two or three days, 70 per cent of its foliage. We were completely unable to assign any cause for that problem. I simply wondered if Martin with his long experience had found anything.

MODERATOR KEEN: Did you observe that the internal part of that leaf had little brown corky areas, or a resinous area, just in dots in localized areas with no pattern?

MR. HILL: No more than plants immediately adjacent that did not defoliate. It was not the entire block but just plants within the block.

MR. deWILDE: We found that if you use concentrated lime sulphur dormant spray that that helped considerably. We used 12 gallons of concentrated lime sulphur solution to 100 gallons of water and put on with the hydraulic sprayer and after a few years we stopped having that trouble.

MR. HESS, SR.: What time?

MR. deWILDE: In February. If you were going to use the cutting pretty soon, I would do it two or three weeks before taking the cutting. You run into trouble sometimes with the lime sulphur causing burning in the bench. It pays to wash the cutting off with a solution of water. That is found to be fairly effective.

MR. VAN HOF: You know it is strange but it is generally the year after the transplanting of *T. cuspidata* that we get it. Then the following year most of them grow out of that and they are really nice, compact plants again. But the trouble is, we ship them and our customer has the same trouble again. So what it is, we don't know. As I said, they will work on it and some day they will come up with the answer, no question about it.

MODERATOR KEEN: I saw mature specimens at some nurseries, out by themselves, that just let go suddenly last year, and the ground was covered with needles beneath them.

MR. WELLS: Do you find *densiformis* difficult to root, as was reported earlier?

MR. VAN HOF: No, we don't.

MR. WELLS: We don't either. We find it one of the easiest and the most vigorous rooters of any. I wonder if there aren't two strains.

MR. FILLMORE (Fillmore's Valley Nursery, Centreville, Nova Scotia): I have been wondering, regarding the application of manure as the last operation after you have disposed of your cover crops, it strikes me that you are introducing a lot of weed seeds which you might have done away with had you used at least part of that manure on your cover crop.

MR. VAN HOF: My answer to this is no. I will tell you why. We might have put the manure in at the end of the first year, yet you will bring it up or mix it up with the soil. Now, I haven't found a way yet of getting the weeds in so deep that they wouldn't come back any more. I don't think anybody has so far, so I don't think your problems of cultivating more weeds is on account of the application with manure; the seeds are just in the ground and you bring just a few more in there.

MR. FILLMORE: My suggestion was a large proportion of your weed seeds would have germinated and perhaps almost be a failure as plants while so heavy a crop of probably buckwheat or rye was on the surface, and in that way, finally you wouldn't get so many weeds. Also, the manure would have encouraged, I believe, a much heavier growth of cover crop to turn down.

MR. VAN HOF: The green crop will bring in our humus again and, of course, we are just not interested. We want humus. How much do we take off?

MR. HESS: Two inches a year.

MR. VAN HOF: It takes a lifetime to put one inch back. By bringing that green crop right in there, we build up the humus and at the end of the final thing, before all the manure has deteriorated, we bring in the manure and work it thoroughly because it is going to feed those plants for three long years. I hope this answers your questions.

MR. A. M. SHAMMARELLO (South Euclid, Ohio): How many crops have you raised on the same land?

MR. VAN HOF: My bosses' father was growing nursery stock on that land 20 years before I came there and I have been there 31 years.

MR. SHAMMARELLO: You still have topsoil?

MR. VAN HOF: We still have topsoil left. It is by bringing in the green crops all the time. Jack Hill has been there several times. Several people here have been through our place. The propagating place, one part of it is 58 years old. We just put in and take out.

MR. LOWENFELS: I am surprised somebody hasn't brought this up. In the town where I live, the town collects leaves and I happen to be in right with the street cleaners and such, and they leave leaves at my place, and in a year I have fine soil. Isn't that of benefit? Why isn't it done more? It is like adding soil.

MODERATOR KEEN: It is a source in some places.

MR. JIM ILGENFRITZ (Ilgenfritz Nurseries, Monroe, Michigan): I would just like to add another note of confusion to this transplanting business that Martin is talking about. At Monroe, Michigan, across the lake from here, we take those little cuttings out of the greenhouse bench and we treat the field in the hot sun the latter part of June or early part of July and we plant in 28-inch rows, and we water very carefully. We don't do this carelessly. We do it carefully. We don't put any shade on whatever and those plants never see a pot. They never see any shading and I think we get growth comparable to what Martin has shown us. The reason I mention it is because I think all of us have learned from our grandfathers that we had to shade these tender little plants, but I don't believe we do.

MODERATOR KEEN: We, each of us, live in a different spot too! them not with Wiltpruf but with Plantect and we take them right out into

MR. VAN HOF: You know we haven't the room to put them in rows.

MR. ILGENFRITZ: Four inches in a row?

MR. VAN HOF: We couldn't do it, then, because we give them four inches each way!

MODERATOR KEEN: It is too bad to break off this discussion but we have to get back here.

PRESIDENT CHADWICK: Thanks to all the speakers on the panel this morning. I think we have had some very good information. Certainly there has been a free exchange of information about *Taxus* propagation and planting.

The session recessed at 12:00 o'clock . . .

RECESSED.