



A Review of Current and Potential Seedling Production in Ontario for Afforestation

Ontario Ministry of Natural Resources

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Executive Summary

In November of 2000, the forestry consultants, Merin Enterprises hosted three workshops in southern Ontario on behalf of the Ministry of Natural Resources, to review current and potential seedling production in the province. Merin Enterprises held sessions with private nursery operators in northern Ontario as well. Unless otherwise stated, only seedling production for afforestation purposes is discussed in this report.

The workshop participants, representing various and wide ranging interests connected to afforestation, were asked to respond to the following questions:

- 1. How many seedlings can the private sector nurseries produce?**
- 2. Why are these seedlings not being produced? (*Identify the barriers to growing seedlings in larger numbers for afforestation purposes.*)**
- 3. Is there a role for container stock?**
- 4. Is seedling/stock quality an issue?**
- 5. Are there other regeneration methods that should be considered? (*Note: this question was only posed at London and Kingston workshops and was included at the request of participants at the London meeting*)**

An analysis of the input received resulted in the following recommendations to assist in the increased production of seedlings:

- the establishment and funding of a central agency to coordinate the forecasting and confirmation of seed and stock demand, to coordinate appropriate seed collection and banking, and to coordinate the stock production and distribution in southern Ontario (and to align the work of this proposed agency with the FGCA's seed and stock source certification program, *Ontario's Natural Selections*)
- the improvement of the quality of seed and seedlings being sold and the standardization of stock descriptors from the current "age class" to a "size class" parameter;
- the subsidization of planting stock and planting programs;
- the introduction of appropriately sized containerized seedlings for use in appropriate planting conditions

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- the development of a public education and marketing program to improve the private landowner's understanding of afforestation planning, options and costs (especially as related to the market value of seedlings and the lead time required to obtain appropriate stock)
 - the development and articulation of a Ministry of Natural Resources policy on private land forestry and afforestation

A Review of Current and Potential Seedling Production in Ontario for Afforestation

Introduction

During the early 1990's, the Ministry of Natural Resources (MNR) implemented a new business plan that refocused the MNR's role in forestry on certain core business areas. As part of this business planning, a decision was made to remove the MNR from its traditional operation of bareroot nurseries.

The first phase of this change occurred in 1993 when MNR announced that the Thunder Bay, Midhurst, Chapleau and Gogama nurseries were to be closed. The second phase, begun three years later, ended with the closure and sale of the nurseries located at Kemptville, Orono and Thessalon. The final phase of removing the MNR from operational seedling production began in 1998 with a process to privatize the three remaining bareroot nurseries of Dryden, Swastika and St. Williams. This final phase was completed in 1999.

About the same time, as a result of the same business planning process, the MNR downsized operations across the province, closed some district offices and cancelled a number of programs that had been offered to the public for many years. The impact on afforestation programs in southern Ontario was significant.

The planting program declined from an estimated peak of 34 million tree seedlings sold for private land planting in 1992 to less than 6 million seedlings in the final year of production, 1998. The current level of planting on private land is not well known – there are no programs, MNR or other, that track this information from the now, largely private, nursery sector.

The MNR decided to investigate the status of the afforestation program in Ontario and to determine whether private growers are able to produce quality, seed source appropriate seedlings in sufficient quantities to meet anticipated afforestation needs for private landowners. The investigation was also to shed light upon the potential seedling supply for programs related to climate change and carbon sequestration.

This report presents the results of three workshops held in southern Ontario and discussions held with private container seedling growers in northern Ontario. The intention of this project was to determine the current and future availability of seed and seedling stock for afforestation purposes. The intent was also to identify limitations that may exist in meeting the anticipated demand for appropriate, seed source identified seedlings.

In southern Ontario, the workshops were held in Barrie, London and Kingston. Invitations were extended to private industry, conservation authorities,

stewardship councils, private nurseries, and other parties who had an interest in afforestation in southern Ontario. The participants were given four or five questions to answer. They were then divided into smaller groups to discuss the questions, highlight limitations or concerns and provide possible solutions to identified problems. Finally, participants were asked to present their findings for further discussion and recording. The comments were captured by individual workshop and are listed in Appendix I (Minutes of the Workshops).

In northern Ontario, a number of container seedling producers and LUSTR Co-op were contacted individually to obtain information on the ability of this industry to respond to seedling needs for afforestation purposes and to identify any shortcomings or limitations.

LUSTR Co-op represents a large number of private growers many of whom attended their annual general meeting in Timmins on February 19 to 21, 2001. Their input was also sought at that time.

Summary, Discussion & Analysis of what The Participants Said

The following summary was drawn from the comments made during the three workshops held in southern Ontario and the individual discussions held with private growers and LUSTR Co-op in northern Ontario.

Participants at the southern Ontario workshops were asked to respond to the following questions:

1. **How many seedlings can the private sector nurseries produce?**
2. **Why are these seedlings not being produced?** (*Identify the barriers to growing seedlings in larger numbers.*)
3. **Is there a role for container stock?**
4. **Is seedling/stock quality an issue?**
6. **Are there other regeneration methods that should be considered?** (*Note: this question was only posed at London and Kingston workshops and was included at the request of participants at the London meeting*)

1. How many seedlings can the private sector nurseries produce?

Response Summary:

All growers at the workshops and those contacted in northern Ontario confirmed that nursery capacity is not a problem, all other things being equal. Growers at the workshops indicated that they had sufficient land capacity to significantly increase seedling production at their particular nursery.

Nurseries operate in a highly competitive market and were unwilling to provide exact numbers related to current or future capacity during these open sessions. Current capacity numbers were provided during an individual follow-up survey of the nurseries. There was reluctance to discuss exact numbers during the workshops, but no southern Ontario grower disagreed with the suggestion that there was collectively, sufficient unused land base to return to the maximum bareroot seedling numbers produced by the former MNR facilities (i.e. in excess of 30 million seedlings per year).

It is important to note that the discussion about nursery capacity did not include limitations such as technical ability, quality, infrastructure requirements and funding.

Northern Ontario

In northern Ontario, a significant increase in new production area of container greenhouse nurseries has occurred in the last five years. According to "LUSTR Co-op's Canadian Reforestation Growers Guide" (1999) there are 27 major container growers in the north. At the same time, growers indicated that there has been a decline in the number of seedlings being ordered by the major forest companies. Discussions with private growers and with LUSTR Co-op identified a current, unused capacity for approximately 50 million seedlings in northern Ontario greenhouses, based on the average 70 – 80 cubic centimeter container suited to a 1-0 conifer. Since afforestation activities, especially in southern Ontario, would require a much larger container (e.g. 150 cubic centimeter plus) to deal with old field sites and hardwood species, the capacity would be lower, probably in the neighbourhood of 35 to 40 million seedlings.

Southern Ontario

Merin Enterprises contacted 107 private nurseries from a list of 300 (+) taken from two sources: the "1999-2000 Native Plant Resource Guide" and from Landscape Ontario's membership listing. The nurseries were contacted if they produced the size of nursery stock suitable for afforestation purposes.

Other smaller nurseries in Ontario may not be listed by either of the two sources. It is estimated that those covered by these two sources probably represent 98% of production capacity in southern Ontario.

Of the 107 nurseries contacted, 24 responded to the questionnaire requesting information on their production capacities.

Many private nurseries declined to respond to the request for production numbers. They indicated that they did not wish to compromise their competitive position in what they felt was a highly competitive market.

The survey respondents provided information that shows 11.6 million seedlings are available for planting in Ontario in 2001. This number is a mix of bareroot and container stock types. The number also represents a significant number of species, some of which are not native to Ontario.

Discussion and Analysis:

The survey results raise some concerns. While many respondents indicated that they were aware of Ontario's tree seed zones and that their seed sources were identified, many would describe the seed source as "local". It is unclear whether this "local" designation means that the seed was collected locally or whether it was purchased locally.

In summary, ignoring for now the constraints to seedling production that will be discussed in other areas of this report, southern and northern Ontario growers said that land base and greenhouse area are not limiting factors to an increase in seedling production.

2. Why are these seedlings not being produced?

If there is a significant capacity to grow more seedlings, why are they not being grown? The workshop participants and the northern Ontario container growers provided significant input on this question.

Background:

When the Ministry of Natural Resources operated nurseries, production was based on both historical demand levels and fairly consistent contact with private landowners. Prior to 1992, the number of seedlings being grown was not restricted by the availability of provincial funding.

Private landowners, dealing with the MNR, were not required to enter into long term agreements for seedlings. Most stock orders took place in January and February meaning the MNR grew much of their crop on speculation and historical planting trends. For the most part, nursery inventories were based on this trend data and other local information collected by forestry field staff in the district offices. The district office staff also played a lead role in making sure sufficient seed was collected from their areas.

The MNR operated nurseries to supply its own regeneration efforts and obligations. This program involved both regional and provincial 'roll-up' of the District demands in order to keep supply and demand in a balanced, affordable and realistic steady state.

If the seedlings grown and lifted for a particular year and for a particular seed zone were not all used, the surplus was often composted or dumped into a landfill site. Excess stock in one seed zone could not be used in an under-supplied seed zone unless the proposed transfer was reviewed and approved by a genetic resource management specialist.

Response Summary

No Speculative Growing

Private nurseries can not dispose of large numbers of unsold seedlings given the monetary investment made in their growing. Growers are reluctant to produce tree seedlings, in significant quantities, without being paid a portion of the production cost "up front" or as a minimum, having a firm legal contract for the purchase of the seedlings. "Up front" payments can mean one year prior to shipment for containers and up to 4 years prior to shipment for transplant stock.

Many growers indicated that they could afford to grow only up to 10% more seedlings than what they have prepaid orders for. This is a standard industry buffer that many growers use to make sure that they have sufficient seedlings to meet their orders. Given the low numbers of suitable seedlings (i.e. source-identified, native species) currently growing in private nurseries, this additional 10% would not provide significant seedlings for unplanned planting programs.

Small Order Size and Efficiency

Another limiting factor is the high number of small orders. Small private nurseries do not have the customer base that would allow them to consolidate orders to produce larger blocks of single seed sources. Small orders that require different seed sources require compartment fragmentation to maintain seed source identity and subsequently increased cultural and handling costs.

Once again, the impact of the loss of the MNR's centralized system can be seen. The efficiency of the MNR ordering system and its nurseries allowed large numbers of orders to be rolled up into larger blocks of seedlings. The MNR nurseries also worked in partnership with each other. Individual nurseries did not have to carry all species and stock types for every seed source. This arrangement allowed certain nurseries to specialize and achieve additional economies of scale. The administrative infrastructure of the MNR then allowed the seedlings to be shipped to the appropriate nursery for distribution.

Centralized Demand/Ordering System

After considerable discussion at all three workshops and with private growers in northern Ontario, it became evident that the loss of a centralized demand forecasting and order system had a significant, negative impact on the supply of seedlings being grown for planting on Ontario's private lands.

At all three workshops it was suggested that the re-establishment of a centralized ordering system could remove some of the limitations to seedling production mentioned earlier. Suggestions included establishing a centralized order system operator such as the government, Conservation Ontario or the Ontario Forestry Association. The central operator would once again co-ordinate the collection of demand information, collection and banking of seed, and contract growing of the correct seedling stock in larger blocks. The actual mechanics of such a body's work or funding was not provided.

Cost of Seedling Stock

Workshop responses indicated that the historical cost of MNR produced seedlings has continued to affect the market for seedlings. Private landowners had become accustomed to the subsidized seedling price.

Based on the last five years of MNR seedling production, the direct costs of seedling production was approximately \$0.56 per seedling. During the 1998 final spring shipping season, the cost of an average seedling had risen to \$0.28. Even with this 50% subsidy, private landowners reduced seedling orders and registered many complaints with the government.

Prices vary in the private sector depending upon the species and the nursery. The cost per seedling can be as low as \$0.22 and as high as \$1.50 depending upon species, stock type and order size. Comments by private land planting groups said that private landowners are reluctant to bear this "real" cost of seedlings on their own (just part of the total reforestation costs) when they consider the social benefit of establishing a plantation on their property.

As could be expected, workshop participants suggested that the provincial government should once again subsidize the cost of planting stock. In contradiction of this idea, others suggested that market value seedlings encourage private landowners to take more care of their investment.

Lack of Public Education – Marketing Initiatives

Workshop participants said that government action in education and marketing would increase the acceptance of higher seedling costs. Participants suggested that such initiatives should also promote appropriate seed sources and the social and environmental benefits of afforestation.

Seed Availability

The collection of appropriate seed continues to be a limiting factor in the production of seed source appropriate seedlings. Most nurseries were aware of Ontario's seed zones. Workshop participants indicated that the uncertainty over the future of the Ontario Tree Seed Plant was not beneficial. This uncertainty coupled with MNR withdrawal from seed collection coordination, resulted in many growers dealing with largely American commercial seed businesses, private collectors or collecting their own seed.

Limits to Container Stock Introduction from Northern Ontario

Container growers in northern Ontario identified several barriers to their participation in the southern Ontario market. They have no contact with the clients and no real way to ascertain the demand. Most growers were also concerned about the species and stock size. They suggested that the size of seedlings for the northern Ontario market would not be well received in the south. A learning curve would be involved to produce stock required to meet the southern market.

Distance to the customers is also a potential problem. Shipping costs would add to the price, and on smaller orders the price would be even greater. Most northern Ontario growers prefer to deal with larger bulk orders as opposed to individual landowner requests. They suggested that a centralized coordination body could help to overcome this limitation.

The container growers also raised concerns about the private landowners' and tree planting agencies' (e.g. CA's) understanding of the container stock type. Most northern growers are aware that bareroot stock has been the mainstay of the planting program on private land. They suggest that a program of education and landowner awareness of the container seedling would help to overcome this barrier to their product.

Discussion & Analysis:

The 300+ private nurseries in Ontario are independent and in a highly competitive market where profit is necessary and high inventories costly. They can only carry a small number of seedlings on speculation. As such the range of species and seed sources will be limited and may result in inappropriate stock being planted.

Coordination of demand and growing

A major barrier to increased production and planting of seed source appropriate seedlings, is the lack of coordination of demand and supply. The long-term success of reforestation, both on an individual plantation and landscape scale will suffer due to limited choice of species and appropriate seed sources.

The establishment of a coordinating body would address a number of the barriers and limitations that were identified by the participants at the workshops and by container growers in northern Ontario.

Participants did not describe this body in any detail. It is however, possible to conceive of a structure that would be the focal point for landowners wishing to purchase seed source appropriate seedlings. A central body could then compile the demand for seedlings and work in partnership with the Ontario Tree Seed Plant to ensure that the appropriate seed is collected and banked against poor seed years.

Once the demand for stock had been determined, the central body could act as a “stock exchange” where private nursery growers could compete for stock contracts. The central body could then work with other organizations to act locally to arrange the shipping of individual seedling orders to private landowners.

This description is not definitive and there are many details to be addressed, however, there would be substantial benefit to all parties involved if a central body can be established to coordinate private land planting in the province.

Public education and marketing

Public education and other awareness programs are needed to help landowners with species choice and to highlight the need to plan and order in advance. The lack of these efforts is a barrier to increased planting and production of seedlings. The MNR should play a leadership role in partnership with groups such as Conservation Ontario, Ontario Forestry Association, the Stewardship Councils, the Forest Gene Conservation Association, OMAFRA and many others to create a single education and marketing effort to promote reforestation on private land. Given the initiatives regarding climate change and carbon sequestration, the multi-program involvement of several levels of government could also be included.

Costs & Incentives

The only real agreement was that the higher the seedling cost, the fewer trees will be planted. Low, subsidized seedling prices are still in the minds of many private landowners and it will take time for the true cost of seedlings to become “acceptable”.

Some incentive is needed for landowners to purchase stock at market value from private nurseries. The afforestation of private land does not just result in a benefit to the landowner. There is a benefit to the people of Ontario. To this end, it can be argued that there is justification for some type of government seedling subsidy program. Such a program could be used to offset the cost of seedlings and allow increased planting to occur.

All private growers have to make a profit or they will no longer be in business. It is clear then, that any incentive to plant must be targeted at the landowner. Programs like the Managed Forest Tax Incentive Program (MFTIP) are helpful but do not provide sufficient financial encouragement for a landowner to undergo the significant capital investment of a large planting program. An actual disincentive is the Income Tax rule, IT 373R2 which does not allow for deduction of planting costs from other sources of income. Removal of this rule could have a positive effect on the numbers of seedlings ordered from the private nurseries.

Other jurisdictions provide models of incentive programs. In Wisconsin, landowners can be reimbursed for up to 65% of the costs of plantation establishment under state and federally sponsored programs. This implies, however a commitment of government funds towards such a program. Workshop participants thought that an incentive program, regardless of its costs to government, would be instrumental in any attempt to increase afforestation.

The private growers identified the stability of any increased demand as a concern. Growers could not finance large infrastructure changes (greenhouses or cold storage) for a short-term program and therefore will not expand production. The life span of any planting program must be evaluated and a growing plan adopted that will incorporate this reality.

It may be more efficient to use a larger number of smaller nurseries to meet the planting requirements without resorting to significant expenditures on infrastructure. This could only be accomplished if there was a coordination body to assist in collecting demand and orders.

Respondents also suggested the establishment of a “trust” similar to the Forest Renewal Trust that provides funding for forest renewal on Crown land. A trust could be established to support the proposed central coordinating body to subsidize planting programs on private lands. Private companies might make contributions to a trust if planting projects could be undertaken in their name to give them an environmental stewardship profile.

Part of the funding for this trust could operate as a ‘rolling loan’ from the government to underwrite the seed and stock contract deposits. Such an option is advisable as MNR experience shows that most landowners could not be expected to consistently order trees two years in advance, which is the necessary lead time to ensure appropriate seed supplies and begin stock production. Private landowners tend to place their order during the winter immediately before the spring planting season. This loan aspect of the trust fund

would help to solve the problem of the reluctance or inability of seed collectors, growers, tree planting agencies and the Ontario Tree Seed Plant to speculate to ensure seed and stock supplies will be available.

In summary, the limitations or barriers to increased seedling production and planting all seem to hinge on three needs being addressed:

1. The need for a central body to coordinate seed collection, seedling production and market demand. It was recommended that the MNR take a leadership role in having such a body become a reality.
2. The need for education and awareness initiatives to promote afforestation.
3. The need for some kind of government financial incentive to offset seedling cost to the landowner.

3. Is there a role for container stock?

Background:

Containerized tree seedlings have not been popular in southern Ontario on private land. In the late 1980's and early 1990's, MNR nurseries in the south produced stock in greenhouse or hoop-house facilities using various hard-walled containers that had average volume capacities of 70 to 100 cubic centimetres. Mostly conifers were grown in containers although there was some experimentation with some deciduous species.

In the heavier competition of abandoned farmland planting, these seedlings did not perform well. As well, the landowners wanted to be able to see the seedlings they had planted. They opted for the largest seedling they could purchase and subsequently the demand for container seedlings never materialized. Without the demand, technological development of a larger container as an alternative to bareroot did not materialize at MNR nurseries.

Another factor was price - all seedlings were sold at the same regulated price. The "bigger" bareroot seedling seemed to be the better value for the money.

However, advances in containerized seedling production have taken place in the private sector. Some southern Ontario nurseries began the production of a wide variety of hardwoods in large, rigid plastic containers. But the numbers produced are not significant and the production is directed towards liner seedling production (sold to other nurseries for continued growth as landscape size trees). As well, smaller scale production of such container stock resulted in seedling costs that were usually in the range of \$1.00 each. Given the MNR subsidized prices for the larger bareroot seedlings, this stock type at private nurseries never gained a market share.

If containerized seedlings are shown to be appropriate for the planting sites and growing conditions in southern Ontario, this stock type offers some distinct advantages over the bareroot stock type. The container seedling (comparable in size to a bareroot seedling) can usually be grown in a shorter period of time. This provides the advantage of being more responsive to changes in demand.

Container stock requires less specialized handling than bareroot and can be planted over an extended season. Subsequently, late springs and droughts can have less of an impact on seedling quality and survival.

With the use of modern technical equipment, container seedling production also uses less seed than bareroot production. This reduces the burden on seed collection although the requirement for seed purity increases.

Response Summary

The infrastructure on most nurseries is not conducive to large-scale container production. Though several southern facilities are highly mechanized for efficient container production, the majority of private nurseries, which have an interest in the afforestation market, are smaller operations. They do not have the means to finance the infrastructure (greenhouses and automated, precision seeding and filling equipment) that would be needed to compete in this market.

Seedling users at the workshops showed some interest in container stock. But they wanted to see standards developed to help ensure success with this stock type. They and the growers also suggested that container growing regimes for hardwood species need to be developed.

Workshop participants focused on the need for public education about container seedlings if they are found to be an appropriate alternative to the traditional bareroot seedling. Many private landowners like to see an “instant” plantation. The larger the seedling, the quicker they can see the plantation in place on the land. Seedlings will have to be produced in much larger containers or the stock will need to have superior growth potential so that it establishes quickly and begins significant growth.

Planting program participants pointed out that landowners would need additional information if post-planting care differs with container stock use. A possible example is increased tending in the form of manual competition removal or herbicide applications.

Workshop participants clearly indicated that bareroot is still the preferred stock type. Though many said that given the appropriate evaluation and standards, container grown seedlings might prove to be a valuable tool in specific afforestation efforts.

Discussion & Analysis:

Container production can respond more quickly to an increased demand. Conifer bareroot production requires an average of 3 years. Large container stock can be produced in half the time depending upon the production regime and the species. For conifer production, the container size and cultural practices are known and can be readily transferred.

However, most bareroot deciduous stock types have a production cycle of only one to two years. Container production, in very large containers will take roughly the same time to produce a similar sized seedling.

Also there is considerable concern about the lack of information on root formation of most deciduous seedlings grown in containers. Long term plantation viability and growth is not known for the majority of species. Though root culture practices for deciduous bareroot species has been well developed, container root culture practices are limited and will need to be further developed for many species. As well, it is critical to develop tending practices on standard afforestation site conditions for container seedlings.

Cost will continue to be a barrier for this stock type. Current prices for larger container deciduous seedlings, being grown as liner stock for the landscape industry, range from \$1.00 to \$2.00 depending upon size and species. With small-scale production levels on smaller nurseries, economy of scale is not an option and such costs could remain high.

In summary, the decision to use container stock must come from a 'fitness for end purpose' perspective and not just fitness for quick expansion of seedling production. Containerized seedling production must be considered as just one possible option in a crop plan approach. The crop plan will dictate stock needs in terms of the size, seed source and cost needed to realize specific afforestation objectives on specific planting site conditions.

4. Is quality an issue?

Background:

The MNR established quality standards based on a size class criteria (See Table 1). Considerable effort was put into the cultural operations and culling to ensure stock of a consistent quality. These quality standards are not the same as those of private nursery growers nor is there a consistency of standards among the private growers.

Response Summary

Stock quality is an issue and a subject of confusion in the workshop discussions, from information gathered from seedling users and from contacts with stock producers in northern Ontario. There is a very obvious need to address quality issues if production is to be increased.

Seedlings are often categorized by age class (i.e. one year old, or 1+0, etc.). But this tells the buyer nothing about its size or physiological condition. Workshop participants were concerned with the variability from one grower to the next for seedlings of the same age. They were more concerned about the variability within the production of a single grower. Uniformity of shipping stock was a

concern and a possible barrier to increased planting. Landowners want value for their planting dollar and in their opinion good value does not include very small to large seedlings in the same shipment.

Discussion & Analysis

Stock Standards

A standard quality descriptor based on a size class standard should be used when describing seedlings. This standard could be set using MNR size classes, which were based on subsequent performance in the field (See Table 1).

Table 1. Ontario nursery stock size class parameters

Species	Stock Type	Parameter	Size Class			
			small	medium	large	x-large
All conifer (except Pine)	Bareroot	Height (cm)	na	15 – 25	25.1 –40	40.1 – 60
		Diameter (mm)	na	3.0+	4.0+	6.0+
		Height:Diameter	na	<70:1	<70:1	<70:1
		% of seedlings	na	90%	90%	90%
	Container	Height (cm)	7-15	15.1-25	25.1-40	na
		Diameter (mm)	1.3+	2.0+	2.8	na
		Height:Diameter	<110:1	<100:1	<90:1	na
		% of seedlings	90	90	90	na
Pine	Bareroot	Height (cm)	na	15 – 25	25.1 –40	40.1 – 60
		Diameter (mm)	na	3.0+	4.4+	6.8+
		Height:Diameter	na	<60:1	<60:1	<60:1
		% of seedlings	na	90%	90%	90%
	Container	Height (cm)	7-15	15.1-25	25.1-40	na
		Diameter (mm)	1.3+	2.0+	2.8	na
		Height:Diameter	<90:1	<80:1	<80:1	na
		% of seedlings	90	90	90	na
Hardwoods	Bareroot	Height (cm)	na	16– 25	26 –50	51 – 100
		Diameter (mm)	na	3.0+	.4+	6.8+
		Height:Diameter	na	<60:1	<60:1	<60:1
		% of seedlings	na	90%	90%	90%
Wildlife	Bareroot	Height (cm)	7-15	16-25	26–50	51-100
		Diameter (mm)	na	na	na	na
		Height:Diameter	na	na	na	na
		% of seedlings	na	na	na	na

*Hardwoods and wildlife species have traditionally been produced only as a bareroot product.

Nursery Operations

A grower's equipment and operational practices affect the quality of seedlings. MNR nurseries had the benefit of large-scale operations, which justified the use of specialized equipment for specific cultural practices. Such equipment is often too costly for smaller, private nurseries. As well, some cultural practices can only

be efficiently carried out with this specialized equipment and a certain physiological quality cannot be achieved where this equipment is not used. On relatively small nursery operations, it is possible to apply cultural techniques by hand to smaller seedling numbers and in so doing improve the seedling quality. However, the labour costs will increase the cost of the seedling considerably.

Cold Storage Facilities

Seedling quality is also affected by the storage conditions after lifting. Without a large cold storage facility, it is not possible to get into large-scale production for larger planting programs and maintain seedling quality.

Planting stock achieves maximum growth potential when it is planted as a dormant seedling. In order to take full advantage of this dormancy in the spring, seedlings have to be lifted and packaged for cold storage for often up to three weeks. Such cold storage buildings are expensive and not currently common on most private nursery operations in southern Ontario. In northern Ontario, many container producers have invested in large cold storage facilities and they have become experienced with cold and frozen storage practices. The lack of cold storage on most private nursery operations in southern Ontario could be considered a barrier to production if individual large-scale production is the desired end. A central coordinating body could investigate using facilities of apple growers, etc to expedite distribution.

Seed Quality

The potential for high quality seedlings is determined first by the quality of the seed. Private seed collectors are the crucial first link in the chain of people who provide customers with planting stock. In southern Ontario seed collection is complicated by many variables - over 100 native trees and shrubs, infrequent seed years, uncertain markets and small private operators with variable experience and knowledge in what is at best a seasonal occupation. Some growers have commented that they can not always get the native species seed they want. Others have commented on seed that is of poor quality, misidentified by species and of unidentified source. When they can't get local seed (from a collector or the Ontario Tree Seed Plant) they buy from large seed houses where the source is often unknown or uncertain and therefore not appropriate. In some cases seed collectors have the seed but could use help marketing it. People do not value seedlings but this is even truer for seed.

The Forest Gene Conservation Association is working with the OMNR Tree Seed Plant and other agencies (CA's, etc) to improve this situation with a voluntary seed certification program – *Ontario's Natural Selections*. This program includes education to raise consumer awareness of how important high quality source-identified seed and stock is to the success of their planting efforts. Efforts also include seed collector training, certified seed and stock marketing and a system of inspection and audit for seed source identity. This is a new program, which

targets primarily private land in southcentral Ontario where the OMNR Tree Seed Zone Policy doesn't apply. The development and initiation stages have been funded by the OMNR (an FGCA founding member) and foundation grants. The FGCA will be looking for more help from the government to subsidize the operational costs (e.g. field audits and inspections) as per the provincial Managed Forest Tax Incentive Program. The idea is to ensure a no cost scenario to participants, since (as noted elsewhere in this report) the cost of tree planting is already an issue that won't bear additional pressure. There is potential to align FGCA's current efforts with the proposed central coordinating body.

5. Are there other regeneration methods that should be considered?

Use of Seed/Cuttings

This question was outside of the original scope of this project, however participants at both London and Kingston workshops wished to record that there were options that could result in more afforestation but which did not include the use of seedling stock. Participants suggested the planting of seed or cuttings of appropriate species. They recognized that these are not common or otherwise well known practices and that resources are needed for trials and technology transfer before such methods could be used with any confidence.

Planting Density

Some workshop participants experienced with planting programs suggested that we should do more with fewer seedlings. A reduced number of seedlings planted per hectare of land could help to spread a scarce resource over more area and at a reduced planting cost. Numbers can be reduced while still achieving the desired forest cover with the added advantage that there is a reduced need for subsequent thinning of the stands. Such a suggestion should be pursued and if found viable, landowner education should follow.

6. Other Issues Raised:

Workshop participants discussed other impediments to the production and planting of seedlings.

Government Policy

Some participants commented that the Government upon its exit from reforestation had not set any positive, enabling policy related to afforestation on private land. Despite the focus of the participants on the operational aspects of afforestation they felt that government policy is important. Workshop participants were told that a number of projects are being undertaken towards the development of such a policy.

Financial Support

For the majority of the participants, policy remains a distant and nebulous concept. Private landowners wanted readily available, consistent quality, inexpensive planting stock. Private nursery operators (both in northern and southern Ontario) wanted guaranteed commitments and up-front funding for multiple year crops. Conservation Authorities wanted a consistent source of quality, seed source appropriate seedlings. But no one wants to or can afford to pay for this up-front, and this creates a gap between supply and demand.

A consistent request for government financial support to promote afforestation came from the private landowners, growers and larger organizations such as the Conservation Authorities and Stewardship Councils. The nature of the support was not so unanimous.

Some suggested that seedlings should be subsidized at the nursery and others suggested that this was not appropriate. The majority suggested that any financial incentive would best be placed in the hands of the private landowner. It is here that the most important long-term decision is made to commit land. The market for seedlings is established by this private landowner need.

Nursery Technology Transfer

Some private nursery operators in southern Ontario want the government to be more actively involved in technology transfer to help them consistently produce the quality seedlings needed.

Private nursery operators in northern Ontario felt that they were at the leading edge in the technological aspects of seedling production and did not require such tech-transfer assistance. However it must be noted that they benefited from government assistance in the start up years of private nursery container production in northern Ontario.

Seed Supply and Post Planting Considerations

At all workshops, there was concern that promoting increased planting without also promoting tending and maintenance programs would not result in successful afforestation efforts. As well, an increase in planting is not going to happen unless there is a preceding increase in seed collection and banking.

Partnerships

There are many potential partners that can work together on a coordinated effort to ensure reforestation/afforestation programs in southern Ontario survive the long term.

Next Steps: Where do we go from here?

There is potential to increase the private sector production of seedlings in Ontario. Workshop participants in the south and container growers in the north provided many suggestions on how to achieve an increase. They also pointed out barriers and limitations to be removed or otherwise overcome.

There is a tendency for the MNR to view these problems from its historical reforestation program perspective. But such a view is not productive given MNR's exit from an operational program. The situation must be looked at in new and innovative ways.

An analysis of the input received suggests that an increased production of seedlings could be achieved by:

- **the establishment and funding of a central agency to coordinate the forecasting and confirmation of seed and stock demand, to coordinate appropriate seed collection and banking and to coordinate the stock production and distribution in southern Ontario (and to align the work of this proposed agency with the FGCA's seed and stock source certification program, *Ontario's Natural Selections*);**
- **the improvement of the quality of seed and seedlings being sold for afforestation purposes and the standardization of stock descriptors from the current "age class" to a "size class" parameter;**
- **the subsidization of afforestation stock and planting operations;**
- **the evaluation and introduction of container stock appropriate to southern Ontario species and planting site conditions;**
- **the development of a public education and marketing program to improve the private landowner's understanding of afforestation planning, options and costs (especially as related to the market value of stock and the lead time required to obtain appropriate stock);**
- **the development and articulation of a Ministry of Natural Resources policy on private land forestry and afforestation.**

The MNR is well positioned, given their historical expertise and provincial and regional perspective, to bring together the stakeholders required to make these suggestions work. Private landowners, conservation authorities, stewardship councils, all levels of government, environmental organizations, etc. should be asked to contribute to the new thinking that will eliminate some of the barriers and deliver on the items listed above.

Appendix I

Summary of Workshops

1. How many seedlings can be produced by private sector nurseries?

- Ask growers
- Capacity determined by planning process
- Whatever the demand requires
 - What is the demand?
 - What is the future demand?
 - Nurseries meeting current demand
- At least two-year notice required (three for bare root stock)
- Seed availability?
- Deposit required – cannot grow stock on spec
- No technical barriers to producing more stock
- Needs education and awareness by user groups
- 6 million bare root/1 million containers

Problems

- Landowners do not plan for future
- Vegetation control

2. Why are the seedlings not being produced?

- High cost of stock since government backed out of project
- No provincial vision/targets
- Cost
 - No stable funding for purchase
 - Money has to be paid up front
 - Stock cost only half of cost to get it into ground
- Uncertainty of future demand – need 3 – 5 year plans from CAs and Stewardship Councils
- No planning
 - Need lead time to produce stock
- Seed source and supply
 - Not a problem with hardwoods
- No technical advice to landowners
- Need technical advice for nurseries
- No coordination
- Cold storage capacity
- What would gain interest?
 - Subsidy program
 - Incentives
 - Lower prices
- Subsidies should go to landowners and not growers
 - Let market determine price

Problems

- Labour in short supply
- Need coordinator between large number of nurseries
- No one collecting seed
- Seed zones need to be managed by MNR?
- Government use to coordinate – no-one took over after government withdrew from program

- Stewardship Councils and CAs don't do enough marketing
- Past prices for stock when government ran program were artificially low
- Landowners must be educated as to the real value of the forest.

3. Is there a role for container stock?

- Yes
- Large stock only
- MNR needs to be broker – risk management – 3 year broker
- Need partnership between growers and users
- Right site conditions
- Lack of experience
- Positives
 - Longer planting season
 - Easier storage
 - Shorter planting time
 - More uniform stock
 - Can have similar establishment results
- Negatives
 - Frost heaving on heavy soils
 - Different planting technique
 - May be uncompetitive with weeds
 - New technology for hardwoods
 - More expensive to transport

Problems

- Competition - requires tending
- Training gap between growers and users
- What is need in site preparation?
- Expensive for nurseries to change over
- Bias to bare root
 - Need education
 - Need science and technology
 - Need demonstration areas

4. Is quality an issue?

- Depends on growers and cultural system
- Superior stock reduces need to replant
- Stock size
- Seed source/genetics
- Grading
- Standards
- Packaging and handling
- Lack of plantation maintenance

Problems

- Requires research and development
- Education for landowners
 - Customers not concerned about species or seed zones

5. Are there other regeneration methods that should be considered?

- Direct seedling
- Cloning

- Conifer establishment first with hardwoods planted at a later stage
- Willow and poplar from cuttings
- Natural regeneration and succession may work in certain situations but will be slow
- Is the site appropriate for tree production
- Science & technology needs to be developed & shared

Problems

- Concern about how well direct seeding will work in southern Ontario
- Need research
- No point in planting more trees if we cannot protect the woodlands that we already have

6. Other comments

- Need for partnerships in regeneration
- Need for management plan for plantations
- Better to plant and take proper care of 100 trees than to plant 1000 trees and provide no follow up treatments
- Landowners and rural Ontario should not have to bear the full cost for a social problem
- WIA system worked – could have cancelled nurseries and kept WIA program
 - WIA coordinated program
 - Worked with a size that was economical for planting contractors
- Government has a responsibility for setting public policy
 - Needs to accept a minimum role
 - Needs to accept the role of setting targets
 - Needs to accept role of providing landowners with technical advice
- There are real opportunities for partnerships
 - Government/industry/landowners
 - Carbon sequestering may be the tool to do this
 - Government could provide role of coordinating this?
- Government's role?
 - Finding partnerships
 - Technical support
 - Policy making
 - Participate in risk management
 - Use existing agencies – don't create new bureaucracy
- Need nursery or seedling growing association

PLUS – comments Steve Hounsell

1. Summary of the minutes from the workshop held at the Holiday Inn in Barrie on November 7, 2000

Group 1

1. How many seedlings can be produced by private sector nurseries?
 - Not a problem increasing numbers
 - 1 to 2 year notice required
 - Deposit required – balance upon delivery
 - Containers need to be pre-sold
 - In the past MNR forecasted demand based on past requirements “committed demand)
 - Landowners do not plan for future (2 – 3 years down the line)
 - Vegetation control is an issue that has to be looked into

2. Why are these seedlings not being produced?
 - Seed supply – no system in place
 - Part time seasonal labour – short supply?
 - Planning time
 - No one giving technical advice to landowners
 - Who coordinates? CAs? government? – forecasting?
 - Subsidize deposits on stock?
 - Get industry involved – carbon credits
 - Northern Ontario has a legislated commitment
3. Is there a role for container stock?
 - Requires tending
 - Price sensitive
 - Cost for nurseries to change over
4. Is quality an issue?
 - Depends on growers or cultural system
 - Requires MNR help with research and development and advice
5. Are there other regeneration methods that should be considered?
 - Not discussed in Barrie

Group 2

1. How many seedlings can be produced by private sector nurseries?
 - How many do you want?
 - What is the demand?
 - What is the future demand?
2. Why are these seedlings not being produced?
 - Cost – production and capitalization
 - Production, planting and marketing
 - What is the breaking point?
 - Perceived value
 - Appropriate seed source
 - Rotation cycles
 - Demand cycles
 - What is it?
 - Where is it?
 - Why is it?
 - Who has it?
 - Planning time
 - Partnerships
3. Is there a role for container stock?
 - Yes – depends on demand
 - Site conditions
 - Right size, type
 - Planting techniques
 - Site preparation
 - Prefer bare root

-
4. Is quality an issue?
 - Yes – has to be there
 - Right size, seed source, standards
 5. Are there other regeneration methods that should be considered?
 - Not discussed in Barrie

Group 3

4. How many seedlings can be produced by private sector nurseries?
 - Nurseries meeting current apparent demand
 - Price driven
5. Why are these seedlings not being produced?
 - Long term commitment
 - Need coordination by someone
 - Money has to be paid up front for private growers to produce
 - Someone has to plan on behalf of the landowners
6. Is there a role for container stock?
 - There is a higher comfort level with bare root
 - Need education and experience in southern Ontario
7. Is quality an issue?
 - Not covered by group
8. Are there other regeneration methods that should be considered?
 - Not discussed in Barrie

Group 4

1. How many seedlings can be produced by private sector nurseries?
 - No technical barriers to growing trees
2. Why are these seedlings not being produced?
 - Need lead time – 2 years for container stock and 3 years for bare root
 - Artificial low price on seedlings in the past by MNR
 - High cost of planting small contracts
 - Need technical and information support from a governing body
3. Is there a role for container stock?
 - Historical bias against container stock
 - Need science
 - Need government support
 - Information
 - Promotion
 - Technical support – help landowners
 - Guarantee long term production (growers need deposit)
 - Coordinate and gather pledges (i.e. industry)
 - Quality control system
4. Is quality an issue?
 - yes
5. Are there other regeneration methods that should be considered?
 - Not discussed in Barrie

Further discussion:

- People cannot afford the 30 to 50 cents a tree – cost doubles after planting
- One government funds tree plant, next government doesn't – serious problem
- Who are you subsidizing – landowners/nursery?
 - Someone has to subsidize – i.e. carbon credits?
 - Money will not come from landowners
 - If want major planting for carbon credits, then need major dollars from some source - industry/government?
- Only way this will work is long term commitment – someone has to buy it
 - Government not paying for private land
 - Government only looks after crown land
 - Need education/marketing
 - Make land owner realize value (maybe a tax credit)
 - Need technical support
- Carbon credits – demand could fuel dollars
- Compare dollars here for carbon credits with Europe
- Average tenure for public landowners is ten years
- CAs and Stewardship councils are local experts
- There was a system that was working – WIAs
 - Canceling this was a problem
 - Could have cancelled nurseries and kept WIAs – private nurseries would have taken over
 - WIA coordinated planting – this was good
 - Worked on a size that contractors could economically handle
- Government has a responsibility for setting public policy
 - Needs to accept that role at a minimum
 - Needs to accept the role of setting targets
 - Needs to accept role of providing land owner with technical advice
- If MNR doesn't make some commitments, then the program is dead – we are wasting time
- There are real opportunities for partnerships
 - Government/industry/landowners
 - Needs some form of coordination
 - Carbon sequestering may be the tool to do this
- Finding partnerships/Technical support/Policy making – role of MNR

2. Summary of the minutes from the workshop held at the Four Points Hotel in London on November 8, 2000

Group 1

1. How many seedlings can be produced by private sector nurseries?
 - As many as demand calls for
 - Question is – what is the demand?
2. Why are these seedlings not being produced?
 - Nurseries need seed provided by customers
 - No one is collecting seed
 - Has to be an organized effort
 - MNR has to be a solid partner in managing seed zones and coordinating collections
 - Other jurisdictions such as the USA do not seem as concerned about seed zones – this is an important issue
 - Need dollars up front
 - Need 22 month lead time for container stock and 3 year lead time for container stock

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- Cannot grow stock on spec
 - Rural Ontario cannot be tagged with the costs of paying the bills
3. Is there a role for container stock?
 - Yes – but takes time
 - Need to demonstrate to the landowners that containers work
 4. Is quality an issue?
 - Seed, seedlings, site preparation, tree handling, planting, and maintenance all important
 - Landowners often do not want to invest in plantation maintenance
 - Need methodology to expand sources of funding
 - Packaging and handling of trees not consistent in southern Ontario
 5. Are there other regeneration methods that should be considered?
 - Some concern about how well direct seeding will work in southern Ontario

Group 2

1. How many seedlings can be produced by private sector nurseries?
 - As many as are ordered
 - No problem with capacity
2. Why are these seedlings not being produced?
 - Can't grow planting stock on spec
 - Seed not a problem in hardwoods
 - Demand based on subsidy in part
 - Not a lot of marketing takes place by Stewardship Councils or CAs.
 - Carbon credits one way to go for new dollars
 - Share the costs of plants but still let people know the true costs of the stock
 - Costs should not be born by rural people – community as a whole need to be involved
 - Need advanced warning to grow stock
 - CAs and growers will not take risk alone – therefore stock not grown
 - Education needed about the real value of the forest
3. Is there a role for container stock?
 - Yes – site specific
 - Need research
 - Information gap – lack of experience
4. Is quality an issue?
 - Stock/genetics
 - People do not understand the importance of zone specific seed
 - Education for landowners
5. Are there other regeneration methods that should be considered?
 - Need research

Group 3

1. How many seedlings can be produced by private sector nurseries?
 - Capacity is unlimited
 - Seed availability?
 - Seed collection

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- forecast
 - Needs planning and organization
 - Needs education and awareness by user groups
 - Private land versus crown
 - Government need to participate in risk management
 - Stable source for funding – subsidy (working with a three year cycle)
2. Why are these seedlings not being produced?
- Not being sold
 - No stable funding for purchasing
 - No stable projection
 - High increase in price since government involved
 - Availability of seed
 - Incentive to go into schools to educate children, can use agencies that are in place – but they need the funding
3. Is there a role for container stock?
- Need MNR to be the broker – risk manage – 3 year projection
 - Need partnership between growers and users
 - Lack of experience
 - Training gap – MNR has role to train and manage education
 - Can we machine plant containers?
 - What is needed in site preparation
 - Mind site
 - Don't put all the dollars into program
 - Dealing with outside groups – schools, service groups
 - Provincial/federal/private sector joint funding
 - Multi year funding guaranteed
 - Land owner incentives
 - Can then commit to number of trees in the ground
 - Landowner incentives – need some to project demand
4. Is quality an issue?
- Yes – size, seed zone, source
 - Viability, stock handling, grading
 - Plant – timing – preparation of site
 - Water movement from soil to plug
5. Are there other regeneration methods that should be considered?
- Partnerships – options between CA, nurseries
 - Governments, landowners, community involved – i.e. seed collection
 - North – timber fibre, recreation, ecological - room for balance - more crown land
 - South – potential for reforestation – mainly private land
 - Regeneration – is the site appropriate for tree production
 - Direct seeding – need R & D
 - Getting involved – as costs rise – involvement drops
 - Science & Technology needs to be developed & shared
 - There is no point in planting more trees if we cannot protect the woodlands that we have.
 - MNR role:
 - Organizer
 - Broker
 - Risk manager
 - Use agencies in place now – not create more bureaucracy – organize, advise, fund

Group 4

1. How many seedlings can be produced by private sector nurseries?
 - Capacity and land is there
 - Nurseries would grow seedlings
2. Why are these seedlings not being produced?
 - Need lead time to produce seedlings
 - Species/stock type/quality/seed source
 - Need a coordinator between large number of nurseries
 - Too costly for producers
 - Too costly for buyers
 - Need more technical transfer of information on growing seedlings
 - CAs primary seedling users – limited budget
 - Need a marketing cooperative – allocating products to nurseries
3. Is there a role for container stock?
 - Maybe
 - Positives
 - Longer season for planting
 - Shorter production time
 - More uniform stock
 - Can have similar establishment results
 - Negatives
 - Frost heaving on heavy soils
 - Different planting technique
 - May be uncompetitive with weeds
 - New technology for hardwoods
 - Need to promote research and tech transfer
4. Is quality an issue?
 - Yes – should not be underestimated
 - Need good quality seedlings
 - Seedlings being grown from non-local seed source
 - Need stock production standards – buyer needs to know if stock is “second”
 - Restoration project success will increase when good quality seedlings are used
 - Need MNR expertise and publications for current growers
5. Are there other regeneration methods that should be considered?
 - Conifer established first with hardwoods planted at a later stage
 - Produce willow and poplar from cuttings
 - Sowing seeds may work with hardwoods with other cultural treatments
 - Natural regeneration and succession may work in certain situations but will be slow

3. Summary of the minutes from the workshop held at the Ambassador Hotel in Kingston on November 14, 2000

Group 1

1. How many seedlings can be produced by private sector nurseries?
 - Ask private growers
 - Land capacity exists
 - Growing capacity exists

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2. Why are these seedlings not being produced?
 - No provincial vision/targets
 - No subsidies
 - No provincial structure/programs
 - Short planning cycle
 - Government guarantee of cost recovery to growers
 - Seed source, tending costs
 - License nurseries to grow X amount of trees and guarantee payment
 - Seed source/collection
 - Need 3 to 5 year planting plans from CAs and Stewardship Councils
 - Leadership
 - Why are people not planting?
 - perceived costs
 - Altruism (???)
 - lack of structured program (WIA)
 - little publicity about programs
 - subsidies don't exist?
 - Guidance
 - supply and quality of stock
 3. Is there a role for container stock?
 - Yes – but investment huge
 - Growers are wary of government pulling contracts
 4. Is quality an issue?
 - yes
 5. Are there other regeneration methods that should be considered?
 - a. Cloning
 - b. Natural regeneration
 - c. Direct seeding

Group 2

1. How many seedlings can be produced by private sector nurseries?
 - What's the need?
 - Need a program to drive the need
 - Land base/irrigation
 - 6 million bare root and 1 million containers
2. Why are these seedlings not being produced?
 - Cold storage capacity
 - Manual labour force
 - Money an issue
 - Infrastructure
 - Knowledge
 - Land base
 - MNR had ten nurseries – only one doing traditional production (Kemptville)
 - Lack of program
 - Lack of funding
 - Lack of political will
 - CAs tried but without enough resources (funding cut)
 - Uncertainty
 - Unstable demand

-
- Lack of coordination of program
 - Go for dollars from sources (i.e. industry)
 - Need for coordination
 - Need efficient way of tapping into a diverse set of agencies and activities
 - Identify needs
 - Some customers government adverse/phobic
 - Lots of existing agencies, consultants, avoid waste, overlap
 - Who can lobby cabinet for funding?
 - Sustainable growth needs sustainable commitment to funding
 - Heritage/legacy factors becoming more important
 - Quality of life
 - Air quality
 - Water quality
 - Wildlife habitat
 - Species at risk
 - Love of nature
3. Is there a role for container stock?
- On correct sites
 - Large stock
 - Appropriate treatment after planting
 - Need for larger more robust seedlings
 - What is the grass roots motivation for planting trees
4. Is quality an issue?
- Yes
 - Knowledge
 - Infrastructure
 - Genetic quality
 - Stock quality
 - Physiological/morphological
 - Customer driven – not concerned about species or seed zone
5. Are there other regeneration methods that should be considered?
- Don't like the question as promise is tree planting
 - Other methods depend on site – no wish to detail methods

Group 3

1. How many seedlings can be produced by private sector nurseries?
- Capacity determined by planning process
2. Why are these seedlings not being produced?
- Barriers
 - Cost
 - Demand
 - Seed source knowledge
 - Seed availability
 - Land availability
 - Carrying inventory
 - Lack of foresight
 - All levels of government must provide a strong vision & commitment in reforestation
 - Education

-
- What will gain interest?
 - Subsidy program
 - Incentives
 - Lower prices
 - Subsidies should go to landowners not growers
 - Let market determine price
 - Long term maintenance of plantations?
 - Dollars available from municipalities, government, industry?
 - MNR Role?
 - Education
 - Access to partnerships
 - Hard to find tree planters
3. Is there a role for container stock?
- Yes
 - Storage easier
 - Strong container can be used in reforestation (??)
 - Smaller seedlings cannot compete
 - Superior product now being produced
 - Accept 20% mortality
 - More expensive to transport
4. Is quality an issue?
- Superior stock reduces need to replant
5. Are there other regeneration methods that should be considered?
- Direct seeding

Group 4

1. How many seedlings can be produced by private sector nurseries?
- Show me dollars
 - No limits for producing trees
 - Have to know the demand
 - Need to know producers
2. Why are these seedlings not being produced?
- Lack of seeds
 - Cost of seeds
 - Time barrier
 - Forecasting
 - Landbase
 - Education
 - Marketing
 - Promotion
 - No common understanding as to how system works
3. Is there a role for container stock?
- Advantage
 - can be planted during summer
 - Shorter period of growing time in greenhouse
 - Produce more plant in smaller acreage
 - Easier to handle for planting
 - Disadvantage
 - Takes more room to store and ship

4. Is quality an issue?
 - For all types of seedlings
 - Has to be set up by customer
 - Education
 - Lack of standards
 - Seed certification program

5. Are there other regeneration methods that should be considered?
 - Direct seeding – especially for hardwood
 - Modified harvesting to encourage natural regeneration
 - Direct seeding for selected species

Other concerns

- Who is to advise landowner about type and size of tree to plant
- Need management plans for plantation
- Better to plant and take care of 100 trees than to plant and not take care of 1000.
- Economic – increased value of property
- Carbon credits
- Knowledge of what government wants to do
- Financial incentives – but landowner must be major investor – nothing is free any more
- Promote research
- Many questions unanswered
- Need coordination of finding other sources of funding
- Need to promote research
- Better sharing of information/knowledge – need a network
- Pest management program
- Program to help individuals
- Need nursery or seedling growing association