

The Challenge to the Forest Manager

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INTRODUCTION

As well as constituting a challenge the Second Rotation constitutes a time of great opportunity for the forest manager. By his appraisal of the performance of first rotation crops through an entire cycle of production from establishment to harvesting, he is in a unique position to contribute a wealth of experience and knowledge to the creation of a new generation of forest crops.

He has available to him the results of investigative research, the records of management information, the expertise developed in the ancillary activities of the wildlife and amenity interests. These enable him to chart a course of development which hopefully will avoid the necessity for speculative advances into the unknown, which perhaps were his lot during the first rotation.

However, the process of timber production is always a complex and sometimes a tortuous undertaking. The interaction of relevant factors can be influenced by events and contingencies completely outside the control of the forest manager. He must therefore continue to anticipate and foresee possible developments. Herein lies the challenge. The opportunity is presented in that he can make decisions in the light of known and relevant experience. He must ensure that these decisions contribute to balanced resource management so that the productivity of the resource is assured for future generations.

In relation to the silvicultural practices in vogue during the first rotation the forest manager must ask, has an ecosystem been created which will ensure for future generations the continued maintenance of the forest as a renewable natural resource providing a sustained yield? Is an ecological balance being maintained in, for example, the intake of nutrients by the tree crop and the return of litter and dead plant material to the soil. Is the biological activity of the humus layer such that its break-down is in balance with its

accumulation and a satisfactory N-cycle and nutrient intake are being established which will continue in perpetuity.

Short-term rewards are not a measure of the success of silvicultural practice. Nor is a low-cost technique because it is deemed economically desirable necessarily that which will contribute most to the ecological balance which is so vital to forest renewal. Is the criterion then of the short-term reward or the low-cost technique disturbing the existing site relationships to the detriment of the ecosystem. The answers are not easy or straightforward. The constraints of economic timber-production cannot be ignored.

The problems predicated in the previous paragraphs are invariably associated with proper selection of species. The choice of tree species should accord with the properties of the site. A species going into check on a particular site after perhaps satisfactory establishment indicates that the selection is not ecologically appropriate. Some imbalance exists or has been created (a common experience with first rotation crops). Experience gained during the first rotation, having covered the entire production cycle, is invaluable in determining future species selection.

As far as our major species are concerned, I think we can now say with confidence the type of site suitable for Sitka spruce (*Picea sitchensis* (Bong.) Carr.) Norway spruce (*P. abies* L.), Lodgepole pine (*Pinus contorta* Dougl.), Douglas fir (*Pseudotsuga menziesii* (mirb.) Franco), Japanese larch (*Larix kaempferi* (Lambert) Carr.) and the other species in common use.

This is a time therefore when site mapping of the forest estate can provide an invaluable basis for the maintenance of the production capability of the forest in perpetuity. Species suitability can be matched to site category and the dangers of ecological imbalance in future generations can be diminished.

PRESERVATION OF THE ECOSYSTEM

The importance of the maintenance of the proper ecological profile has been stressed and the importance of species selection in this context. Matching of species to site, however, is not in itself a guarantee of protection to the ecosystem. The maintenance of growth can be and is influenced by fertilisation regimes, by drainage systems, by the application of herbicides and insecticides. Misuse of any of these can have side-effects which could be damaging to the ecosystem. The forest manager therefore must always be on the alert to the inherent dangers and guard against them by judicious practice.

One major source of difficulty is that of *site cultivation* and this perhaps merits some very serious study by the forest manager at the

outset of the second rotation. Many of our first rotation crops have been established on sites which lacked all the requirements of a forest ecosystem. The physical condition of their soils was extremely poor. Their nutrient status was extremely low. Development of tree growth was virtually impossible without intensive cultivation and application of phosphate. Guidelines for species selection were speculative. Nevertheless relatively satisfactory crops have been produced on them. These sites therefore having successfully adapted themselves to forest conditions under the influence of a pioneer crop have now created a forest ecosystem which bears all the hallmarks of developing a desirable ecological progression. The key factor in this progression is the biological layer which has been created by the pioneer crop. Humus in the soil is the heart of soil fertility. The maintenance of a balance between its accumulation and its decomposition or mineralisation is a vital silvicultural requirement, and is therefore vital to the preservation of the ecosystem.

How best to treat humus at the initiation of a second rotation is a matter on which opinions vary considerably. The Germans will argue in favour of intensive cultivation and incorporation of the humus in a very intimate way with the mineral soil matrix. This will ensure early and even mineralisation and rapid absorption of the humus in the early years after establishment when it is most required. They will argue that once the crop is established it will recreate a new humus layer and growth will continue without recession.

The Dutch will argue that the too rapid mineralisation of the humus following cultivation is conducive to 'check' developing in the new forest crop when the humus reserves are exhausted. They tend in practice to disturb the humus layer as little as possible and to employ planting methods involving direct planting into an uncultivated site. Soil-type will, of course, have a distinct bearing on the actual practice in specific cases. On light sandy soils no cultivation will be practised whereas on heavy loams or podsolised gleys a case for cultivation can be made.

As far as Irish practice is concerned, speaking for the mineral soils of the East, South-east (mainly Silurian and Old Red Sandstone podsoles, with acid brown-earths on the better sites, and some lithosols on the worst) the general tendency would now be to avoid cultivation for most situations. The importance of the humus layer to second rotation establishment has been amply demonstrated. No cultivation is required on acid brown earths which invariably have carried a highly-yielding crop of Douglas fir or Sitka spruce. Neither is cultivation required on the better podsoles where cultivation was included in ground preparation for the first rotation. Where cultivation was not practised at the start of the first rotation and where poor crop development could be attributed

to poor physical condition of the soil, cultivation may be deemed necessary. If so, it should be accomplished by ripping rather than ploughing. In this manner while the cultivation effect will accelerate the breakdown of humus, sufficient will be left undisturbed in situ to maintain a balance in the forest ecosystem.

PRESERVATION OF CROP STRUCTURE

The importance of preservation of the ecosystem has been stressed because of its significance in the management of a renewable resource. A second major consideration for the forest manager in the context of the second rotation is that he must ensure that his silvicultural code of practice will enable him to preserve the structure of the forest crop in accordance with the production objectives that have been set. Here the most difficult problem is the maintenance of crop stability throughout the rotation. While no code of practice will prevent windblow absolutely (there will always be catastrophic gale, about which nothing can be done) experience of the first rotation has shown that certain well defined site types are prone to wind-damage in mid-rotation. Gleys and peaty gleys are particularly vulnerable in this respect.

The causes of windblow on such sites can be attributed to a combination of the following.

- (1) Delayed thinnings.
- (2) The practice of line-thinning.
(Other factors have an inter-play here *viz.* the delayed thinning and the timing of the thinning relative to the incidence of the storm).
- (3) The practice of planting on ribbons.
(Again other factors have an inter-play here. e.g. basal sweep and degree of imperviousness of the soil).

The forest manager must therefore modify his silvicultural practice to endeavour to overcome these sources of instability. It is suggested that this can be achieved by application of the following options, or a combination of them.

- (1) *Wider spacing at establishment*
(Planting at 2½m to 3m spacing).
This can be done without appreciable loss of volume increment. An appropriate pruning regime would have to be adopted to maintain timber quality. Furthermore should a delay in thinning ensue the effects would not be so critical. In fact a no-thinning option would be a possibility, should marketing fluctuations indicate that such would be desirable.

- (2) *Incorporation of extraction lanes into the planting pattern*
Extraction lanes created at time of first thinning create lines of weakness. Instead extraction racks are laid out at time of planting and left unplanted. Stability on the edge of extraction lane is thus assured. It is probable that selection thinning would be preferable to line thinning in exposed areas.
- (3) *Use of tunnel plough for ground preparation in exposed areas, followed by pit planting*
This would eliminate the tendency for tree-roots to develop within and along the ribbon, without significant penetration into the soil matrix.
- (4) *Where standard spacings have been used at planting thinning regimes should start early*
Thinning to waste is an option in exposed areas. Root development must be encouraged early to ensure continuing stability.

APPRAISAL OF OTHER RELEVANT FACTORS

The experience gained in the first rotation on other factors which contribute to the successful completion of a rotation of timber production must also be applied to the planning for the second rotation.

- (1) Ensure eradication of pernicious weed growth e.g. *Rhodes-dendron ponticum*. (Use of 2.4.5.T or Round-up).
- (2) Improve planting standards and plant production standards to eliminate 'beating-up', and keep grass-cleaning to a minimum.
- (3) Initiate thinning regime at appropriate time and ensure that access and extraction roading is adequate to deal with the utilisation of produce.
- (4) Practice standard anti-disease and anti-pest infestation procedures at appropriate times. Neglect can lead to widespread proliferation of the problem.
- (5) Harvest in accordance with best known methods in order to produce raw-material at a rate which will maintain the competitiveness of wood as a commodity.
- (6) Revise fire-protection plans to take cognisance of the new situation in the context of internal protection. A crop that was in a 'low-risk' category is about to be classified (or will be in the foreseeable future) as a 'high-risk'.

- (7) Examine age-class distribution with a view to adjusting same by perhaps delayed planting if deemed necessary or desirable.

CONCLUSION

A forest is no longer just a wood-producing enterprise. Incorporated within its basic role we now must integrate other activities which have an undoubted importance in their own right. For example, the wildlife of the forest constitute a resource. Deer and game-birds if managed in a proper manner can be very remunerative assets. The flora of the forest may be significant in a conservation context. The location of the forest may render it unsuitable for public recreation purposes. The forest as a constituent of the landscape is having an impact on the aesthetic appearance of the countryside. All these elements were evolved during the first rotation. Their integration as appropriate into the milieu of the forest may have been on an *ad hoc* basis. The start of the second rotation is an appropriate time to review their roles and to redevelop them in a more harmonious fashion with the overall forest management regime.

The second rotation then is a time when the knowledge and experience gained during the first rotation is applied in such a manner as to produce a viable and wealth-producing enterprise. To create a viable enterprise in any field is always a challenge to management. To do so in the forest enterprise is an even greater challenge. One can I feel express the view with confidence that Irish forest managers will not be found wanting.