

는 2m(이는 樹高 6m되는 林分에서 樹高의 1/3이 가지 치기가 된다), 2次는 ~45m(자루달린 톱 이용)로 한다 또한 필요한 기구를 개발하여야 한다.

셋째 天然闊葉樹林의 撫育指定과 이의 撫育對策이 早速히 樹立 되어야 한다.

間伐은 私有林의 경우는 早期收穫은, 國有林의 경우 大徑材 生産을 目標로 間伐指針이 提示 되어야 할것이

며 林分의 生産目標別 撫育指針이 마련됨은 물론 間伐材 利用技術이 早速히 개발되어야 한다.

이외에도 經濟的 觀點에서 가지치기와 間伐技術이 韓國林業의 特性에 맞게 體系化되어야 할 것이고 토착화 시켜야 할 것이며 不足되는 勞動力 問題를 解決하기 위하여 撫育機具의 導入과 省力技術의 개발이 요망되고 있다.

獨逸의 山林撫育技術

韓獨山林經營機構 管理人 E.L. Scuhr

Techniques of Silvicultural Care and Tending at Forestry in Germany*¹

Korean-German Forest Management Project, Project Manager

First I have to introduce myself as Project-Manager of the Korean-Germann Forest Management Project and please allow me a very short explanation of the meaning and purpose of our Project:

Based on an arrangement between our two governments an agreement has been found that: "The Government of the Federal Republic of Germany shall assist the Government of the Republic of Korea in improving the management of Korean forests, by means of a *Joint forestry Management Model Project*" ...to develop a widely applicable planning system for the management of Korean forest regions... to achieve greater profitability and efficiency in all important aspects of forest management. —The aim in a long term period: to increase the value of the forests for timber production, to increase the protection-function of the forest against soil erosion and to increase the value of the forests in all other protecting functions, especially for the important water resources.

Since about two-third (2/3) of the total forest-land in the Republic of Korea are shared by privately-owned forestland mostly in small-sized properties. Korean Office of Forestry and GTZ-Deutsche Gesellschaft für Technische Zusammenarbeit (German Agency for Technical Cooperation) agreed "to set up a trial and demonstration pilot project for the systematic management of the small privately-owned forests in the Republic of Korea and in order to

promote the initiative of the forestland-owners to establish forest cooperatives which shall operate on a voluntary basis.

The main aims of this Project are according to the "Plan of Operations"

- 1) to contribute towards the improving of the incomes of the rural population,
- 2) to restore the natural forest nutrient cycle which has been upset due to the excessive removal of organic matters from the forest,
- 3) to assist in improving the conditions of the local timber industry by achieving sustained yields of commercial timber.

To achieve these aims the Project has to be active in many different fields and for this the Project-team (Koreans and Germans) is divided into several sections: The "Management and Plant Production-Section" with Mr. Ehrhardt and Mr. Han Jong-Hi as counterparts is concerned with the establishment of the forest-cooperatives and the development of practical forest management in this cooperative area. Here we touch a fairly new field in forestry: to come to improved and reformed human relations between owners or small private forestland and foresters.

The farmers and forest-owners must be convinced of the importance of forest management at their forestland, they must become "forestry-minded" and understand that their small forest-properties only can

*¹ Meeting of the Korean Forestry Society (16.02. 79)

be managed economically in close cooperation with their neighbouring forestland-owners in the way of forest cooperatives. And they have to learn, that we foresters are their friends and not their foes that we like to give them advices and care for their forestland in a professional way for their own and the whole countries benefit.

The "Trial-Section" with Mr. Müller and Dr. Mha as counterparts is analysing the ecological conditions of the forest-land to find the most suitable tree species for the different types of site and the most suitable way of afforestation and other silvicultural measures. Its results shall be useful to be practised at the management-section.

Furthermore project-members and other foresters and forest-labourers are to be trained in some new developed forest activities.

The "Agro-Forestry-Section" with Mr. Winkler, an agronomist is to find ways how the need of the rural population in fuel, fodder, fertilizing material etc. can be met without negative interference in forest soil and forest stand. There are several possibilities of separated or mixed kinds of agro-forestry production.

A common problem which occurs here-as in most countries with a fast industrial development is the increasing lack of labourers in the country side especially for forest labour. But without a sufficient number of forest labourers forest management cannot be realized.

To overcome this problems the Project had to come more and more to special techniques in silvicultural treatments and mechanization of forest labour. In the time of the fast industrial development after world-war II in my home country we had to face the same problems which only could be met by mechanization and technical means; but this only could be executed with a team of fully skilled and highly qualified forest labourers, the "Waldfacharbeiter", who works in a fulltime profession (no job).

By this I come to the actual point of my contribution to this meeting: Techniques of silvicultural care and tending at forestry in Germany: Finally I hope that by this meeting some interest has grown

in our Project, its plans and activities. Being a model project we are always interested in proposals, suggestions and discussions about our problems especially with the distinguished members of this society. We always are thankful receiving competent guests at our Yangsan-Field-Office to connect scientific and practical experience with the actual conduct of our daily project activities.

Techniques of Silvicultural Care and Tending at Forestry in Germany.

The main task of forestry still is to produce a special kind of row material. Other natural resources as coal, minerals or crude oil or others are prospected in a limited area as a fully developed row material still to be improved and refined for different use and purposes by the industry; but those resources cannot be reproduced.

Our row material, the timber and wood, can be produced and reproduced, but always in very long terms of production and on a vast area of productive forestland. The forester has to find the best productive and the most economical way to produce this timber in as much quantity as possible with the highest percentage of quality possible.

For this purpose the forester must know his forest with all the different realities and powers of nature: the types and kinds of soil, the contents of humidity, the different climate conditions etc. with all their changing proportions. He even can find ways to increase the production of volume, for example by right selection of tree species for each type of site, by suitable mixture and composition of tree species or by natural or artificial fertilization. But we foresters have the possibility not only to produce timber in the volume and quantity as the site conditions allow it; by several techniques of silvicultural care and tending in biological and mechanical ways we can produce timber in the best quality possible depending on the starting conditions of the stand.

This means a strong effort of money and labour during the time of production, but this expensive and additional work later shows very economical effects.

As an example from Germany for oak-timber from a poor untended stand in very poor quality you might earn about 50-60 DM per cubic meter, but veneer-oak with a decent diameter after good and frequent silvicultural care and tending shall reach a value up to 5,000 DM per cubic meter.

As foresters we have to study nature, we have to study the character and the being of the living tree and its need for a sound growth. With that knowledge we are able to direct and force the development of that tree in a way we like to have it growing. But in many cases we even have to outsmart nature to produce quality timber by using mechanical tools and machines.

But our efforts of care and tending must start right from the beginning, from the outplanting of the seedlings, not mentioning the necessity of good quality of the seedlings produced at the nurseries.

Of course, we always have to regard the different conditions of each different site, and we must be flexible to find the right measure for each local condition. The limited time today only allows that I mention a few measures in silvicultural care and tending of tree stands, which are executed in Germany with good success. Later we shall see some slides which explain more details.

There is the angle planting in common use in Germany. I still remember, during my practical training before I went to the university, for planting a tree we had to dig a big hole, moved out all the loose soil, which sometimes dried out, than carefully we planted the tree, but in many cases it died. One day somebody discovered that by this way of planting the texture of the soil with its capillary action has been spoiled and the water supply for the seedling has been interrupted. But I even remember that many foresters being accustomed to the old traditional way of planting disliked this fast and to their mind inaccurate method of planting, and I have to admit, when first time I saw how the two cuts with that special hoe were made, the seedlings turned in and the soil pressed down, I could not believe that this kind of planting trees ever could be successful. We have some of those special hoe with our Project, and I hope later this kind of

planting can be demonstrated to you.

But there are even several other methods of planting which all can be executed successfully, depending on the local conditions.

After afforestation we have to pay attention that the planted area remains evenly covered with trees; the number of trees or seedlings per *ha* depends on the growth and the demand of the different species. Blanking and weeding must be done carefully and not too late, to keep the uniformity of the young stand. Planting machines are used in Germany when the conditions of the forestland allows it, as for planting pine seedlings on flat to hilly, sandy sites around Frankfurt/Main in the Rhein-Main area. But before buying an expensive machine we have to calculate if those expenses are worthwhile, and if there are enough possibilities to employ that machine frequently.

With good after care and tending the young stand develops to a dense brushwood (*Dickung*). Soon we have to execute the first thinning or clearing-Läuterung, as we call it in Germany. The kind and the degree of this clearing again differs from stand to stand. We remove the biggest trees, which mostly have many big branches, are of poor quality and hinder the development of the neighbouring trees. That clearing can be done by cutting the trees with a small hand- or power-saw or in some cases we spray some chemical or attach it with a brush, to kill the cambium, the growing cells between wood and bark. Later when there are labourers and time available those trees can be felled and utilized.

During this measure of the first thinning, we also have to open up those dense young stands by laying out a network of small lines or patches to better overlook the inside of the stand and to ease further measures. Then we look out for "plus trees", trees with promising quality for the final stand equally distributed over the whole stand. These plus-trees are to be marked with a ring of paint for later being pruned. That pruning shall be executed with special pruning saws or with pruning machines. The number of trees to be pruned and the height of pruning depends on the quality of the stand. The pruning height is mostly between 5-10m, but it is

better to prune more trees only up to 5m than a small number of trees up to 10m.

By all those measures we developed the structure for the future stand and after all these harsh treatments of the young stand for a while it needs a rest for its further development; but by steady observation it must remain under control of a forester or a special skilled warden.

The next step for silvicultural care and tending are frequent thinnings. According to my old teacher for silviculture, Prof. Olberg, marking of trees for thinning is the most important task for a forester, when it is up to him to decide the future and the quality of the final stand.

In intervalls of ten years by an inventory of the whole forest district, the base for the future management, each stand shall be inspected and it is laid down how much volume of each different species in each different stand is to be cut out within a term of the next ten years. This again is the aim

and support for marking the trees to be taken out. All negative members of the stand with poor shape of their crowns or stem or with crowns which interfere better trees should be marked for felling under consideration of an equal distribution of trees over the compartment or stand.

The felling operation only should be executed by experienced and skilled forest labourers; the trees must be felled into a definite direction without any damage to the remaining stand.

Those professional forest labourers today in Germany are well trained and frequently attend special courses at schools for forest labour always to be up to date with the newest development and knowledge in their specific field. They are the final but very important arm or the staff of forest personnel who cares for and tends the forest in ecological and economical ways to achieve best results in the production of timber in quantity and quality for the benefit of the whole population.