The classical silvicultural systems embody a systematic nomenclature that identifies methods for the cultivation and regeneration of crops and facilitates definition of a wide range of treatment.

As defined by Troup (1952) a silvicultural system is the "process by which the crops constituting the forest are tended, removed, and replaced by new crops resulting in the production of woods of distinctive form". As Smith (1962) points out the silvicultural system designates the whole plan of silvicultural treatment during the whole life of the stand including **both** reproduction and intermediate cuttings. Thus the **system** concept includes considerably more than the reproduction method which is used to identify it. While concerned with the continuing culture of the stand, silvicultural systems are closely related to methods of yield regulation that have developed in association, and also with the organizational considerations embodied in the concept of the Managed Forest and the forest management plan. Again quoting Smith "One of the main objectives of regularized application of well defined silvicultural systems is simplicity of administration. In fact the silvicultural system is a device of management rather than of 'pure' silviculture". This 'all embracing' aspect of the silvicultural system is not always recognized in North America.

Each system is designed to meet a specific objective under given circumstances. While there are only so many kinds of cuttings that can be made in a given stand at a given age, and there are only so many stand structures, overall treatment variations constitute an almost limitless array. For description and definition, points on this array are defined. Troup used a schematic classification based upon the form of crop produced, followed by the distribution of regeneration fellings, first in space, then in time. Under each specific category he named and described one or more successful variations. For example, within the major High Forest category the Uniform (shelter-

Toward a 'systemized' silviculture

wood) System has fellings conducted uniformly over the area, distributed in time, whereas the Swiss Femelschlag or Irregular Shelterwood has fellings distributed discontinuously both in time and space. Troup provides an abstract description of the system under discussion while also giving a specific example of its use in practice.

Smith adopts a rather different approach to the systematic description of regeneration methods. He presents the ecological effects of a range of regeneration fellings as a set of continuous functions, perhaps suggesting that the characteristics of entire systems may also be regarded as continuous functions with the defined systems serving as discrete points in the relationship.

From another viewpoint silvicultural systems which integrate biological, yield regulatory, and administrative considerations may be regarded as an amalgam of the interactions of forestry practice and the forest ecosystem. To meet the requirements of ecosystem manipulation a combination of the features of several silvicultural systems may be necessary. It must be emphasized that these systems are not rigid; their interpretation is flexible within clearly defined limits for each system. Circumscribed but often wide limits for adjustment lend a greater constancy to management than is possible even with rigid prescription of detail. The silvicultural systems described in the texts show us how other foresters have found solutions to their local problems. Modification will almost always be necessary but the usefulness of standard, precise description and terminology far outweighs any inadequacy for describing all possible treatment patterns.

In which **JACK THIRGOOD** of the Faculty of Forestry, University of British Columbia, rides his pet hobbyhorse

Under intensive practice, the treatment applied to any given management unit may differ considerably from the type system. Under extensive practice there can be less recognition of local variation, but here the advantages of overall definition are possibly of greater significance than under intensive working because of the ease of management prescription that is possible.

The many advantages of a systematic silvicultural approach appear often to go unrecognized. What is the alternative? Closely defined blanket prescriptions and marking rules that seldom can satisfy the range of conditions encountered in the field situation? Or generalized slogans and catch phrases that mean different things to different people? Paradoxically it appears that the approach to overall stand management by way of the silvicultural system has been rejected for an alleged lack of flexibility, yet our North American management often attempts a much greater definition in its silvicultural prescriptions through, for example, marking rules, than does that of other regions where there is greater dependence upon the silvicultural judgement of the practitioner.

More effective communication will result from the use of clearly defined and universally understood terms that embody an entire management concept, than when these ideas must be developed and described anew for each separate occasion. Curtis (1967) is only the most recent American forester to make a plea for standard nomenclature. Perhaps the new multilingual Forest Terminology (Ford Robertson 1971) will speed the day when this desirable condition is reached. The present difficulties facing United States foresters over the clear cutting issue have not been made less by their habit of indiscriminately designating as such all methods of removing forest cover other than selection, and irrespective of the extent to which the ground may already be occupied by the successor stand. There has been a lack of identification of the harvesting with the regeneration method.

The approach through the silvicultural system is directed to facilitating the solution of technical problems by foresters who are equipped by professional training, outlook and understanding, with the silvicultural judgement necessary for efficient biological manipulation in the field

situation. Under such conditions an abstraction or working concept that summarizes empirical experience and knowledge may be acceptable even although it goes beyond the limits of present detailed knowledge of biological processes. Dependence upon discontinuous, and possibly isolated experimental findings provides no simple framework for the accumulation of experience knowledge in terms meaningful to the forester. There can be no real substitute for the observing of the developing forest situation in which each managed forest is its own experiment with provision through a silviculturally oriented management plan for maintenance of adequate records. Moreover the less empirical experimental plot approach provides a very complex base for the development of practical solutions to local problems.

Although the day is long gone when a case had to be made for research, we have to be careful that the need for research does not become an excuse to delay decision making. The conduct of day to day forestry operations can rarely wait upon the painstaking accumulation of information that is inherent in the research process. Most often we have to seek the best working solution from the alternatives open to us in the time available rather than await upon the development of the "best" solution in absolute terms. Pragmatic judgement has an important part to play.

The values that lie within the silvicultural system as a management tool may be appreciated when comparison is made with our prevalent "systemless" management. Perhaps the greatest fault in this is the misleading separation of the management of the current growing stock, the regeneration of the stand, and the organization of the managed forest, in substitution for the recognition of the inter-related nature of all forestry activities. Although we are dealing with a biological resource much of our present day "management" is abiological and includes little disciplined integration of the si-

tuation complex beyond yield regulatory and administrative considerations. This compartmentalization of our thinking perhaps has risen partly from the active rejection of concepts European in the past, partly from a lack of long-term perspective in management planning and partly from the paramount needs of introducing organized exploitation and stand improvement in previously unmanaged forest. We tend to confuse the management of the forest business with the management of the forest estate.

Inherent in the classical silvicultural system is the acceptance of harvesting as an integral part of the silvicultural process. These systems, in providing for the systematic regeneration of the forest and the conduct of a sequence of cultural practices throughout the rotation, often involve complex cutting patterns that were developed when the tools of the silviculturist/harvester were the broad axe, cross-cut saw and the horse. With the mechanization of woods operations these traditional silvicultural methodologies are often no longer practicable and the harmony that previously existed between exploitation and silviculture in the managed forest has been lost.

In consequence, in large degree the holistic approach that was inherent in the rational management of the organized forest has also been lost and the harvesting operation is carried out with little regard to silvicultural requirements. Much of the problem is due to our failure to apply the biological knowledge that we already have and our preoccupation with the machines themselves. This is a classic case of concentrating on the means rather than the end. To put this right we need to know our projected aims — our management objectives. This is fraught with all the problems of uncertainty involved in long range forestry projections. On the one hand we see a future practice directed to the growing of limited quantities of "fine" timber, while on the other the production of bulk supplies of cheap wood and fibre with a much reduced emphasis on form and dimension of

individual trees. In both cases we must find substitutes for labour intensive processes.

Highly mechanized systems may demand a high degree of standardization and uniformity of treatment over large areas, but we must return to a recognition of the harvesting phase, not as the completion of the forestry cycle, but as the beginning. If the harvester must recognize his silvicultural responsibilities and the engineer his responsibility to develop machines that permit more refined silvicultural techniques and cutting patterns, the practicing silviculturist must equally accept the pressing necessity of developing modern counterparts to the traditional silvicultural systems in the light of the realities of late 20th century forestry.

Some advances have been made, for example, in brush clearing, draining and tree planting, but these are just a start. Occasionally there are glimmerings of the radical departures that are necessary, as witness the tree shears and the planting gun and bullet, with all the implications for future mechanization and rationalization of nursery management, planting techniques and woods operations that are inherent in these breaks with traditional practice, and more recently essays into the hitherto unexplored realms of aerial planting.

Yet these techniques have yet to be systemized in their application in Forest Management. There is need for joint undertakings by teams of silviculturists and mechanical engineers working in field scale situations to evolve the new silvicultural systems that are necessary.

Only in this way can we hope to develop a meaningful and systematically applied silviculture that satisfies present day opportunities and constraints.

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Participation 2

We received just over 100 suggestions for collectives in the forestry field. This number, however, came from four people only. Not bad though as that is a 33% increase over competition No. 1. Our entrants were **D. L. Handley** (Nanaimo, B.C.), **G. Pierpoint** (Maple, Ontario), **M. C. Millar** (Prince Albert, Saskatchewan) and **R. M. Strang** (Edmonton, Alberta). As in the first competition, entrants from the west outnumber those from the east.

Considering collectives for trees, we have an awe of sequoias and a lair of larches (DLH), a plethora of poplars and an incense of cedars (MCM), banks of jack pine (GP) — or as it is perhaps now, a divarication of jack pine (contributed by a confusion of taxonomists). GP also thought of a conference of conifers and a googolplex of trees (look that up in your Webster's). MCM's collective for plantations was parcels, but GP's was regiments.

MCM and GP also varied on the collective for caterpillars,

using tent and munch respectively. GP and RMS thought of bark beetles as a bore or a burrowing, whereas DLH contributed a gallery of ambrosia. Other differences, perhaps reflecting points of view, were: a tally (GP) and a curse (MCM) of cruisers, a germination (RMS) and a scatter (GP) of seedlings, and a planting (RMS) and a stand (DLH) of foresters.

Other ones we liked were an ouch of devil's club from DLH; a clatter of computer programs, a dig of soil pits, and a synergism of site factors from GP; a complaint of loons, and a split of axes from RMS. On the gloomy or perhaps realistic side of things, RMS saw a horror of harvesters, a discord of advisors, a disarray of managers, a menace of weed-killers and a devastation of porcupines.

In only two cases were the same collectives contributed by more than one person (RMS and GP). These must now be taken as accepted: a whine of chain-saws, and a smell of pulpmills.

Participation 4

This being the Holiday Season our next Participation turns to lighter matters. Some poetry is needed. We ask you to complete the limerick whose first line is "There was a young

forester gay". Submit your entries to The Editor, 17 Elizabeth St. N., Richmond Hill, Ontario. **Deadline: January 31.** Offerings will appear in the April issue.

Taxonomy of Virginia Creeper

*Parthenocissus quinquefolia*¹ Linn.
Has a dirty but nice sin-o-nym²,
Authorized for a maid
Who strangled her trade
And let Vagina quinque-feelia³ in.

¹Noted ascending *P. virginiana* near Richmond, Va., and often noted as a constant associate of *P. rigida*.

²Etymology due to the well-known Irish expert Dr. Phil O'Log Coll. Trin.

³No authority given as not approved by Int. Bot. Nom. Cong. Proposed *V. quinquefeelia* (Day) Arm.