

Proposed Future Research Directions

Vegetation Control Section

Forestry Department System Maintenance Division

Ontario Hydro

R. Gardner

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Abstract

This writer is retiring from his present position and has over the past months formulated a number of ideas for future research and development in the vegetation control section. This work covers the use of herbicides growth regulators and soil sterilants as well as chemicals used in horticultural fields. Comment is made with regard to design and evaluation of experiments and data collection from such experiments. Internal and external attitudes towards our work are examined.

Future Research

Since I will be retiring from my position in this Commission towards the end of July, now would seem an opportune time to set down some thoughts on possible research projects for my successor. Over the last six months, I have endeavoured to keep notes on those areas which apparently warrant further study.

The first area is that concerning the efficacy of the materials that we presently use. It would seem possible that we can economically reduce the amount of herbicide used in our brush control operations if we can find successful adjuvants and sticking agents. At this time, there is apparently no adequate literature review of this subject. Dr. Leon Smith has conducted a number of experiments on surfactants which can be added to agricultural herbicides. The information generated here would perhaps be a good place to start. Experiments with the phenoxy herbicides, and more especially, high cost selective chemicals, eg, picloram would appear to have great economic potential that could be realized from a modest investment. Few of the basic chemical companies have pursued this area with great tenacity for obvious reasons, however, there is apparently greater interest fermenting due in part to the overall change in climate toward pesticides. Dow themselves, for example, are examining additives for Tordon 101.

Further, as greater information and expertise is developed with growth regulating materials, specific additives which will enhance translocation will assume more importance. To date, this writer has deliberately not used these materials since the response on woody species to the basic regulators is yet to be fully understood. However, a balance must be struck between this selfimposed research exclusion and the potential benefits that could be derived from applied field utilization of these materials.

Also in regard to our staple spray program, it would appear that some improvement could be made to the efficacy of our present herbicides through better understanding of the environmental influences affecting their use. Verbal reports from the field have indicated significantly different efficacy from phenoxy herbicides when certain temperature and humidity factors are present. It would seem possible to be able to better pin down values for both temperature and humidity above which penetration and translocation of the herbicides is so poor as to be uneconomic.

The area of economics in relationship to time of spray and density of a brush is one which requires further examination. It would appear that as our rights-of-way are generally brought into better condition the time lapse between spray periods will fluctuate within certain limits depending on seasonal climatic conditions and thus seasonal growth rates. This being the case, it should be possible to establish a particular relationship between growth, brush density, and the gallonage of material required in a specific brush density. Thus, a projected model of the economics of a particular spray year in relationship to the potential cost per year over the elapsed time between spray periods, could be constructed.

Refinement of our ground spray techniques has been a continuing trend, however, the evolution of our aerial spray programs has been somewhat ragged, although progress dramatic.

It would now seem that as our two present techniques will be here to stay for the immediate future. Now would seem a particularly good time to refine both techniques particularly the aqueous application of herbicides from the air to as fine a pitch as possible. The present cost of aerial application differs little from that of ground sprays in moderately rough terrain and it would seem that, with further development, the use of aerial application could be extended. Such extension is, however, contingent on demonstrable evidence that equal control per year, per spray is given to that of ground operations. In time, savings would occur from reduced capital equipment costs for ground equipment and reduced labour expenses as both will no doubt make formidable increases in the next few years.

Such control is presently available on a broad spectrum of woody plants found throughout Ontario. However, a number of problem species would appear to be resistant to our current techniques and chemicals. These species encompass both our woody plant spray program, an example here being ash and our soil sterilant programs, an example here being wild carrot. The evaluation of a number of existing materials which are effective against these species is currently projected and no doubt a number of new materials will become available. The efficacy of these materials will require to be evaluated. A good understanding of the biochemical penetration and translocation pathways and a comprehensive chemical description of these materials will be required prior to their introduction into field useage. The onus for such work will, of course, still rest with the regulatory bodies at both the federal and provincial levels. However, as we have seen with the product Tordon, the information development for registration does not always encompass the particular data which we ourselves feel necessary for the continued use of a herbicide. Our present ecology study would appear to be flexible enough in its overall guidelines to accept the inclusion of other chemicals. Close association with this study should be maintained.

The evaluation of both specific chemicals and application techniques has progressed through the years to the present stage of refinement, however, there is as yet no accepted evaluation methodology for all experiments. Although this is not always possible, the standardization of species, along with their numerical and subjective evaluation could be more clearly defined. The measurement of effect; its reliability and its ease of duplication should be examined. Statistical analysis of the results could be better derived through predetermined experimental design and replication.

Thus, a standard format for field experiments and statistical protocol should be formulated. As the experimental design is improved, a more sophisticated data collection method for biological experimentation should be developed.

With the increasing trend toward utility environmental improvement and our own deep involvement in large tree moving and establishment, a number of areas relating to chemical research will have some bearing on the measure of success or otherwise that these endeavours will have. Investigations into the use of anti-transpirants to slow down moisture loss from trees both in transit and initial establishment may show some rewards. These will be indicated in a reduction of the percentage of failure and thus replacement required after new line clearing operations and station screening. This will also be true for investigation into forest tree fertilization after various species in the 3 to 8 metre height class have been moved. The watering regimes required by such trees will also be an area of importance, and successful elucidation of this particular point will have significant bearing on our planting program.

Where trees are exposed to high concentrations of air pollution or during the winter months, to air-carried salt spray, some thought can perhaps be given to the use of plasticized

materials which will reduce damage for conifer species. Many of these materials are similar or identical to those used as anti-transpirants and a combined experiment for their evaluation could be developed. The possibility of incorporating rodent and small mammal repellents in these materials may also be investigated.

Where horticultural plantings are made of trees and shrubs, some thought will have to be given to weed control in close proximity to growing plant material. Alternatives to the phenoxy herbicides which have been developed for and are presently used by the floricultural industry should be reviewed.

Close ties should be maintained with the chemical section in the Research Division who have basic expertise to contribute which is not available in this office. The use of this expertise should be applied where possible and should override previous personality conflicts, as much can be gained from initial small scale studies in many biological and chemical investigations. These studies are an important prelude to, but not a substitute for, large scale field trials which will have to be conducted by Forestry Department personnel.

The initial study of any new chemical, pieces of equipment or method of employment, must be accompanied by a concomitant literature survey. The benefits of determining previous experience are obvious, however, in the past, work has been conducted without an adequate foundation for the investigation first having been determined by a search of the literature and a subsequent summary.

The final area of importance for future investigation encompasses that which has become familiarly known as "environmental considerations". Although few, if any, biological controls of woody brush or weeds have been successfully demonstrated, the time will come when

this or mechanical methods will be desirable to replace the use of some present methods. Public pressure, professional ethics, economics of employment and new scientific considerations may influence the trend in these areas. Long range planning for the changing attitudes, for more moderate consumption of resources and for more efficient use of manpower will be imperative if we are not to be faced with changing circumstances and problems that we would then be ill prepared to deal with until after they occur. The aspect of public criticism is one which asserts considerable pressure on time and credibility if no consistent policy is adopted towards public relations. Although it is not possible to approach each individual with whom the field crews come in contact, much can, and should be done through the media to correct mistaken impressions and to educate the public and pressure groups as to what is fact and what are emotional and mistaken ideas. The field foremen who are associated with local groups have an ideal venue to give talks and presentations on our work. The onus rests with this department to compile slide collections and up-to-date data for such talks. Departmental publications should be consistently revised.

This writer has not dwelt on three specific areas of investigation which can be pursued. These are, growth regulators, reduction of spray quantities, and use of aerial photography in vegetation control. The topics noted here will be dealt with in separate reports each of which will contain specific recommendations.

A handwritten signature in black ink, appearing to read "M R Gardner". The signature is written in a cursive, flowing style.

Assistant District Forester -
Vegetation Control