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Sugarbush Management: A Guide to Maintaining Tree Health

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North American Sugar Maple Decline Project (NAMP)

Abstract

Many pests and other stresses affect maple trees growing in a sugarbush. Some pests can markedly reduce sap quantity; others, although conspicuous, are not important. Stresses can result from activities by people and from natural phenomena. Recognizing problems and understanding the factors that contribute to their occurrence, development, and significance are necessary to maintain tree health. This report brings together current information on the living agents and nonliving factors that can cause problems in sugarbushes. Insects, diseases, improper forest stand management, and unwise sugaring practices are illustrated, and ways to prevent or reduce their effects are described.

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FOREWORD

The episodes of localized sugar maple decline in the Northeastern United States and the more widespread decline occurring in Quebec, Canada, resulted in the 1987 creation of the International North American Sugar Maple Decline Project (NAMP), a joint effort between the United States and Canada. NAMP was initiated by the USDA Forest Service under its Eastern Hardwoods Research Cooperative in cooperation with Forestry Canada. The primary goal of this project is to monitor tree-health condition in sugarbushes and undisturbed maple stands in the United States and Canada through 1990. This manual was developed in support of this goal of evaluating and maintaining tree health.

We hope that you find this guide of value in managing your sugarbush. We view a sugarbush as a complex system, where many diverse and interrelated factors operate over time to influence tree growth, health, and productivity. Every operation conducted in a sugarbush, no matter how trivial, affects not only the trees but all other forms of life as well. It is important, therefore, to "stand back from the trees" and view the "forest" in a holistic sense. We believe this guide is best read leisurely. It is not intended as a set of prescriptions or formulae for handling each and every set of problems that may occur. Each sugarbush is too unique for that. Rather, it is intended to provide a conceptual framework, for we believe that in the long run, a general understanding of relationships between sugar maple and its environment is the best guide for recognizing and preventing problems.

CONTENTS

INTRODUCTION

One of the most difficult, often frustrating, tasks of the sugarbush owner is maintaining and protecting the health of sugar maple trees. Methods for tapping trees, extracting and transporting sap, and producing syrup are relatively well understood. However, when we attempt to manipulate biological systems such as a stand of sugar maple, or a population of defoliating insects, the techniques for success are less clear and tend to reflect a combination of science, art, and intuition.

The ability to sustain a maple syrup operation depends largely on forest management decisions. Decisions on whether the site is suitable for growing sugar maple, how and where roads and trails should be made, when and to what extent the stand should be thinned, and when to control pests will determine the ultimate health, productivity, and efficiency of a sugarbush operation.

In this report we summarize current information on managing sugarbushes to keep them healthy. Sugarbush operators who follow these guidelines should leave their successors a healthy, productive, and lasting resource.

Good forest management requires a team effort. Researchers continually strive to better understand sugarbushes as biological systems, and foresters and extension specialists disseminate the findings from their studies. But it is the sugarbush owners and operators who ultimately must take the responsibility of implementing state-of-the-art practices that they deem useful.

Throughout this guide we emphasize concepts embodied in Integrated Pest Management (IPM). We extend these concepts to include the consequences of stresses caused by human activity and abiotic extremes. IPM strives to address pest problems in ecologically sound and socially acceptable ways. It views insects and diseases as natural components of the forest, and recognizes that cost-effective and ecologically sound pest management must be based on an understanding of the pests and the forest, and how these interact.

IPM is best defined as a "decisionmaking process" based on an understanding of the pest-forest system. As part of this process, sugarbush operators use a set of tools (information, actions, etc.) to answer certain questions that affect the series of management decisions that usually attend each problem. These tools are provided by forest and pest management specialists. For example:

Question: Can a certain insect defoliator significantly reduce sap volume in my bush?

Tool: A description of past impacts produced by that insect on similar sites or stands.

Question: What is the current status of the defoliator population?

Tool: Survey the insect and monitor its status.

Question: If important damage seems likely, how can I control the insect?

Tool: Microbial or chemical insecticides.

Question: What should I do?

Tool: Read about each insecticide and base decisions on the likely degree of control, possible side effects, local social pressures, etc.

Question: Did the treatment work?

Tool: Check the extent of defoliation and monitor the residual insect population.

It is important to note that protection should be an integral part of sugarbush management and that the sugarbush manager must make the decisions. The IPM approach should look at problems that stem from human activities in the sugarbush as well as those caused by insects, diseases, and animals. In the sugarbush, IPM should be used in ways that prevent or reduce problems that could affect the health and well being of maple trees. The program must fit an individual's sugarbush conditions, economic requirements, and management objectives.

To anticipate and prevent problems the sugarbush operator must become familiar with the major pests, their potential for damage, and management options for controlling them. The operator also must be aware of the consequences of human activities that occur in the sugarbush. In the sugarbush, human activities surpass those of any other managed forest, so it is important in a management program to anticipate problems arising from these activities. Integrated Pest Management, therefore, becomes Integrated Problem Management in the context discussed in this report.

SUGARBUSH STRUCTURE AND DEVELOPMENT

Most active sugarbushes have been passed down from one generation to the next or have been leased by a series of operators for many decades. The owner or operator has little choice but to work with what is available and to manage the stand as effectively as possible. Sometimes, however, a new sugarbush must be developed in a new location. In this situation the manager is able to carefully select its location and guide its development.

STAND SELECTION

Because sap collection is a major cost of syrup production, one must first consider the accessibility of the stand and its distance from the sugarhouse. Several site and stand features also must be evaluated. Three important ones are aspect, slope (steepness), and soil type.

Aspect refers to the direction in which the bush slopes. Aspect may influence tree growth as it influences the amount of heat, light, and moisture received by the trees. In turn, these factors affect the duration and periodicity of sap flow. So long as soil conditions are favorable, sugarbushes ideally should be established on eastern to southern exposures. This is a good compromise between suitable growing conditions and good sap production. The optimum slope depends on practical considerations. If the producer wishes to install a tubing system that relies on gravity feed, a reasonable slope is necessary. Even artificial vacuum systems are more effective on a gradual slope. Relatively level ground is desirable when buckets are used. The tree itself will grow well and remain vigorous on a range of aspect and slope conditions so long as the soil is suitable for the species and moisture and drainage are adequate.

Sugar maple grows best on moderately coarse-textured, moist, well-drained, deep soils (Figs. 1-2). Soil depth refers to the thickness of a layer of soil within which moisture and aeration are suitable for root growth. Stoniness has little if any effect on sugar maple growth where the soil is adequate for root growth.

Sugar maple will regenerate and grow on less than optimal sites. For example, many nearly pure maple stands are growing on cool, wet bottomlands. Yet on these sites the natural regeneration of red maple, ash, basswood, or even balsam fir indicates clearly that sugar maple has been constantly favored over these species by forest management. Such management creates an unstable situation as sugar

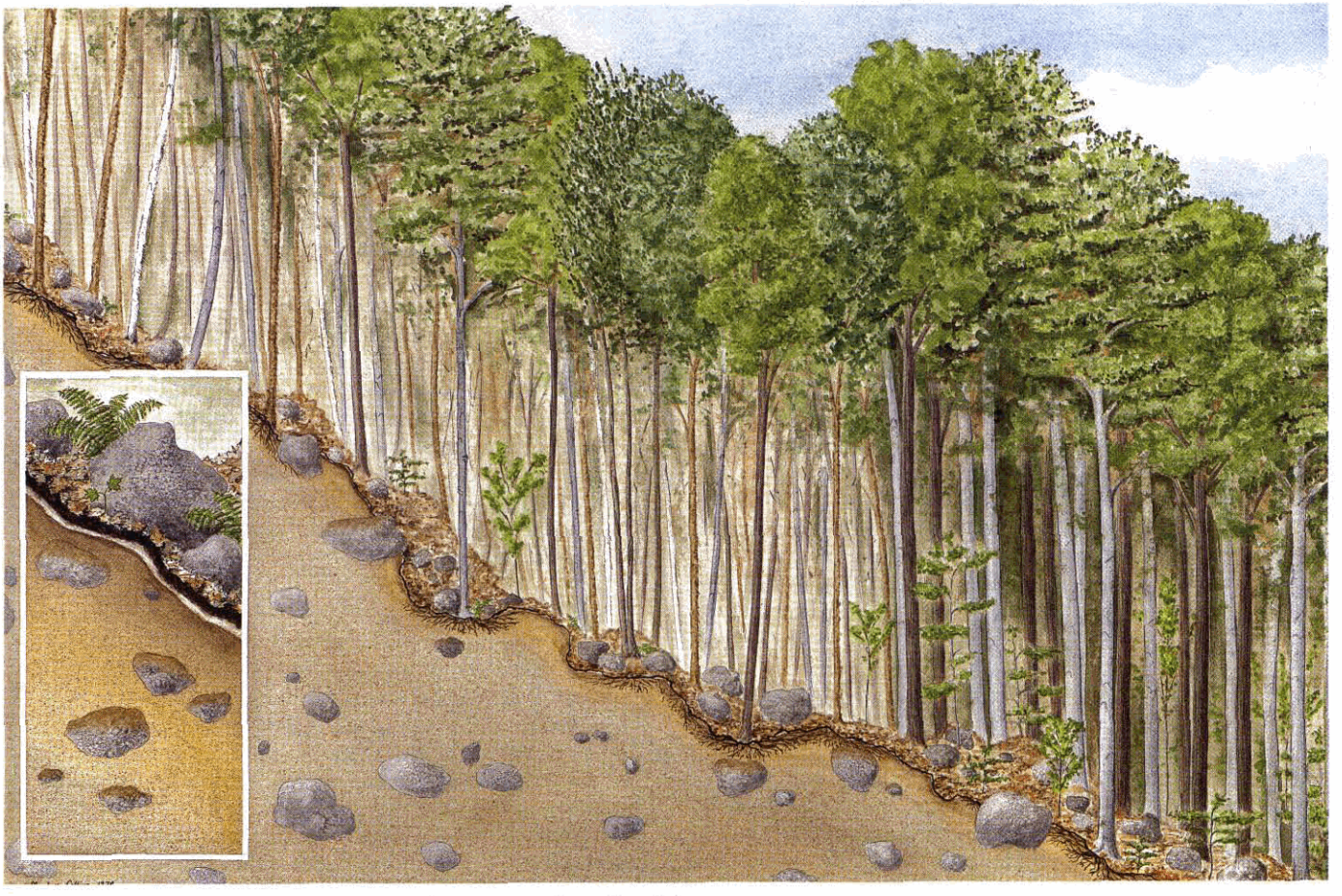

Figure 1.—In New Hampshire, sugar maple grows well on fine tills.