

Canadian Institute of Forestry/Institut forestier du Canada
“Voice of Forest Practitioners”

Position Statement

Integrated Pest Management in Forestry

Nearly half of Canada is forested. These forests comprise 10% of the world's forested ecosystems from which flows 20% of the world's fresh water, and thus represent an integral part of the global life-support system. As a resource, forests also impart considerable economic benefit. Indeed, Canada is the world's largest exporter of forest products. Consequently, Canada is the custodian of an important global natural and economic resource and bears the responsibility to sustain these forests in an ecologically and economically healthy state.

Forests Pests

Canada's forests contain significant biological diversity. Many organisms, from fungi, to insects, wildlife and plants, interact directly or indirectly with living trees and are natural and integral components of healthy ecosystems. Most of these organisms are benign or even beneficial in terms of their impact on tree growth, but on occasion the activities of a very small minority of species may cause growth reduction, deformity and even mortality of trees. In some forest types, tree-damaging organisms are primary sources of forest disturbance and renewal, causing mortality of millions of trees across the landscape. In forests managed for specific values (i.e., timber supply areas, watersheds, wildlife and recreation areas), the activities of tree-damaging organisms may at times interfere with management objectives. During these periods, we consider these organisms "pests". In Canada, forest pests include organisms that damage roots, boles, branches, foliage and fruiting structures of trees. Historically, the most significant forest pest problems have occurred in mature spruce forests (spruce budworms, spruce beetle, root diseases and decay fungi), mature pine forests (mountain pine beetle, dwarf mistletoe, and root diseases), and mature hardwood stands (various insect defoliators, root diseases, and decays). With the advent of more intensive forest management, other lesser-known organisms may become pests.

It has been estimated that the growth of Canada's forests (i.e., stemwood production) is diminished by 30% annually through the activities of herbivorous insects and tree pathogens. Competing vegetation (i.e., weeds) and numerous species of insects and pathogens can also interfere with the successful regeneration of trees post-disturbance (natural or manmade) and thereby delay succession and the reestablishment of forests. Furthermore, the action of certain pest organisms may increase the risk of catastrophic fire and/or initiate outbreaks of other pest species. These impacts may seriously



compromise the productive capacity of Canada's forests thereby limiting the sustainable extraction of resources and changing the long-term quality of the environment.

Integrated Pest Management

Integrated pest management (IPM) seeks to provide rational criteria on which to base decisions to manage pests of Canadian forests. Specifically, IPM is defined as an integrative process where all aspects of a pest-forest interaction are studied and weighed to provide forest managers with an information base for decision making. These aspects include: the ecology of the system; its societal values; its relation to other resources; available management tactics; and their effect on the pest and related ecosystem. IPM comprises one of the primary components of an integrated resource management system.

A sound IPM system requires detailed knowledge of the interaction of the pest and the associated forest ecosystem. If management tactics are to be prescribed then the effects of those tactics on the target organism, the forest stand, and non-target organisms must be understood. Furthermore, the values that must be protected and the cost of protecting them, including undesirable side effects, must be quantified. The benefits from the proposed action should clearly outweigh the costs (economic, socio-economic and ecological). These assessments should be made using information derived from pest monitoring and evaluation programs, our understanding of forest ecosystem function, knowledge of the mode of action of the proposed management tactic, and evaluation of societal response.

Strategies for IPM may be either proactive/long-term (i.e., designed to reduce the probability of future pest impacts), or reactive/short-term (i.e., ameliorate pest impacts once they become apparent). In forestry, long-term tactics to reduce the probability of future pest impacts are largely based on silviculture; the active management of forest stands to reduce their susceptibility. This can be achieved either by selective removal of high-risk stands or modification of their growing conditions to improve stand resistance, alter stand microclimate or increase the prevalence of natural enemies (predators, parasites or pathogens). Regulation or restriction of imported products to prevent the establishment of exotic pests may also be considered a proactive IPM tactic.

Reactive or short-term tactics in IPM are designed to directly reduce the present pest population below an acceptable damage threshold. This may involve harvesting stands that currently harbour the pest organisms (i.e., sanitation treatments), or the application of synthetic or natural products to the forest that are detrimental to pest survival. In cases where long-term tactics are not feasible or have failed and the impact of the pest on ecological and/or economic management objectives calls for intervention, direct control by the application of pesticides or other pest-control products will be required.

Synthetic organic pesticides, which kill pests either through contact or ingestion, are the most familiar direct control agents. The use of these chemicals requires registration and is strictly regulated by the Pest Control Products Act which is administered by the Pest



Management Regulatory Agency (PMRA) of Health Canada. Similar safeguards are required for other pest control products such as microbial pesticides (e.g., bacteria or viruses that cause disease in pest organisms), and synthetic semiochemicals (i.e., pheromones to manipulate pest populations) as they are developed for operational use.

Biological control, the direct manipulation of natural enemies to manage pest populations, can be both proactive and reactive. Typically, the manipulation of natural enemies comprises either the introduction of a new species into an ecosystem (classical biological control), or the encouragement of native beneficial organisms. Biological control, in a proactive sense (known as inoculation), involves the introduction and establishment of a viable natural enemy population in a system where it will spread to inflict an annual level of mortality on a pest population sufficient to reduce damage to tolerable levels. Reactive biological control (known as inundation) entails the propagation of a large number of one particular natural enemy species followed by its release into a pest population. In contrast to inoculation, where the objective is sustained control, inundation emphasizes short-term reduction of a pest population in the immediate area of release. Importation of natural enemy species for potential release as biological control agents is regulated by the Plant Protection Act, administered by the Canadian Food Inspection Agency (CFIA).

The potential for use of biological control has not been fully realized in Canada despite successes associated with inoculative releases of several imported natural enemy species against exotic/introduced pests. As the number of conventional tools for short-term direct control of pest populations diminishes due to ecological and health concerns, IPM systems should incorporate more biological control approaches.

The majority of Canada's forests are under public ownership. Nearly three quarters are provincial; the remainder is mostly federal with a small percentage owned privately. It is the owner of the land that typically determines the nature and extent of IPM activities to be implemented. Since the majority of the nation's forests are owned by the provinces, it is usually the provincial government's responsibility to plan and implement pest management strategies. Regulations often require the acquisition of permits supported by environmental impact assessments and economic evaluations. They also require notification of all stakeholders before pest control operations are undertaken.

CIF/IFC Position

Healthy, productive forests are important to maintain the competitive position of the forestry sector in Canada's economy. More importantly, healthy forests are critical to national and global ecological integrity. The CIF/IFC encourages research in the basic and applied sciences that underpin the development and implementation of IPM systems. The CIF/IFC recognizes that IPM is a critical component of integrated resource management aimed at sustaining long-term forest productivity and ecosystem health.



The CIF/IFC advocates that:

- 1) Development and implementation of IPM systems must be based upon a sound understanding of ecological principles and detailed knowledge of pest life history.
- 2) IPM must encompass the potential for forests to sustain a range of values, recognize the diverse needs and rights of all stakeholders, and establish a balance based upon quantification of the benefits and impacts of alternative management strategies.
- 3) The application of any pest management tactic must be done so only within the framework of IPM.
- 4) Where possible, long-term, proactive management tactics should be considered before short-term direct control options.
- 5) Where direct control tactics are warranted, priority is given to the use of biorational products (i.e., organic products with high specificity to the pest organism, minimal toxicity and minimal persistence) *versus* synthetic chemical pesticides.

The CIF/IFC

The Canadian Institute of Forestry / Institut forestier du Canada (CIF/IFC) is a national voice of forest practitioners. The CIF/IFC, formed in 1908, represents members who are foresters, forest technologists and technicians, educators, scientists and others with a professional interest in forestry. The Institute's mission is "*to provide national leadership in forestry, promote competence among forestry professionals, and foster public awareness of Canadian and international forestry issues.*"

We are people with a professional interest in forestry, working in government, industry, academic and consulting fields. Our members use their education, training, and experience to help manage the forests of Canada and to make the Canadian public aware of forestry.

This is a statement of what CIF/IFC stands for - the Institute's position on Integrated Pest Management in forestry.

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