

SOLUTIONS... AT YOUR FINGERTIPS



*Reduced
Herbicide Rates
in Field Crops*

The purpose of this factsheet, prepared within the scope of the Stratégie phytosanitaire (Quebec's pesticide reduction strategy) is to inform growers of the prerequisites and the risks associated with the application of "lower-than-label" rates of herbicide on field crops (cereals, corn and soybeans).

A number of growers are already applying herbicides below the labeled rates in their fields, and this practice is generating much reaction among the agricultural community. Several studies and field tests have shown that this is an effective approach for reducing herbicide use in field crops, when a given set of conditions is met.

This practice should not, however, be seen as a stand-alone approach. Instead, it should be part of a well-structured integrated pest management (IPM) program that includes appropriate production management, crop rotation and mechanical weeding. Other measures, such as band or spot (localized) treatments, should also be considered.

WHAT IS A REDUCED HERBICIDE RATE?

A reduced herbicide rate, called more formally a lower-than-label herbicide rate, is an application rate **lower than the lowest rate on the actual label** of a herbicide registered for a specific use.

WHAT YOU SHOULD KNOW ABOUT PESTICIDE REGISTRATION

The Pest Management Regulatory Agency (PMRA) is responsible for registration of pesticides in Canada. This organization, which is part of Health Canada, authorizes the use of these products based on data (efficacy, phytotoxicity, residues, behaviour in the environment, and so on) provided by registrants (companies) and researchers. The registered application rates are the smallest rates that are shown to give the desired level of control.

A margin of safety is allowed by the registrant

The application rate recommended on the label by the registrant is designed to obtain adequate performance across most all conditions. Rates take into account factors that can alter the effectiveness and the effect of the treatment, such as weather conditions, soil type, cultivar, crop growth stage and weed development. However, with some herbicides, an application rate lower than what is registered can produce satisfactory results under optimal conditions.

The "effective" application rate depends on the weed population

Not all weed species have the same susceptibility to herbicides. To ensure maximum control, the registrant generally assumes that the toughest species are present in the field to be treated and sets the application rate accordingly.

LOWER-THAN-LABEL RATES AND THE LAW

Manufacturer's guarantee

The registrant (company) guarantees his product within specified limits and assumes no responsibility if the product is not used in accordance with the label. Since lower-than-label rates are not in keeping with the directions on the label, this practice nullifies the guarantee of product efficacy.

The Pest Control Products Act

This federal law governing the use of pest control products prohibits the application of a herbicide or other pesticide under hazardous conditions. In its existing form, it states that the use of a product in a way that is inconsistent with its labeling can be considered as a hazardous condition. Technically, the use of a reduced application rate is at present prohibited by law.

LOWER-THAN-LABEL RATES ARE NOT FOR EVERYONE

Lower-than-label rates are not suitable for all farms

The use of lower-than-label rates requires greater care, availability and knowledge than conventional treatments. Growers who know little about their weeds and the tools available for controlling them, who do not visit their fields on a regular basis and who do not properly maintain and calibrate their sprayers are not likely to reap the benefits of this approach.

POTENTIAL RISKS ASSOCIATED WITH LOWER-THAN-LABEL RATES

Not all herbicides react in the same manner to a reduced dosage

Some herbicides work better than others when applied at reduced rates. Several of the new herbicides on the market are designed to be used at such low and precise rates that any rate reduction could jeopardize treatment efficacy. It is always a good idea to test the effectiveness of a lower-than-label rate before using it on a broader scale.

Lower-than-label rates are not effective in all situations

The application rates set by companies for their products are designed to work even under difficult or unfavourable environmental conditions (e.g. low or high temperatures, rain, drought, poor water quality). Reduced application rates may thus make the product less reliable under variable weather conditions. Growers should not rely on the result obtained in a single year to assess the efficacy of a treatment, since every growing season presents different conditions.

If, at the time of application, these toughest weeds are absent while the other species are at the proper stage of development and exhibit low or moderate density, effective control can be achieved by applying less herbicide than the rate specified by the registrant. In order to address this situation, some product labels now provide a range of application rates that vary accordingly to the weed species and population density involved.

Products labels do not reflect IPM practices

The label does not consider any weed control measures other than the use of the herbicide itself. Yet a number of studies have shown that satisfactory weed control can be attained with lower rates than those specified on the label in cases where the herbicide treatment was combined with appropriate cultural and mechanical methods (e.g. stale seedbed technique, weeding) or if split applications are made.

In addition, registered application rates are generally aimed at controlling weeds, which means destroying the weed population or reducing its growth by at least 80%. By law, labels can also specify application rates for suppressing certain weeds (60% reduction in growth or weed population), a goal which may be quite acceptable in a context of integrated pest management.

PMRA does not, however, consider the use of lower-than-label rates contrary to the spirit of the law, provided this approach does not create conditions that are harmful to the environment or health. As consequence, PMRA will not take any action against growers who apply lower-than-label rates, as long as they ensure safe conditions. On the other hand, any person or organization recommending the use of lower-than-label rates of herbicide may be held responsible for any problems that may arise from this recommendation.

Crop insurance

La Financière agricole du Québec insures the crops of farm owners that apply lower-than-label pesticide rates but does not cover these farms for losses resulting from the use of lower rates.

In addition, reducing herbicide rates entails additional risk, and growers must be ready to assume any losses that may result from a lack of efficacy of the treatment.

Lower-than-label rates are not suitable for all fields

Lower-than-label rates should not be used in fields where the weeds are very dense, difficult to destroy or at an advanced stage of development, hence enhancing the need for growers to know their fields very well.

Persistence of soil-applied herbicides may be reduced

When applied to the soil at a lower-than-label rate, a herbicide may be effective for a shorter period of time than if applied at the full rate. This could allow certain weeds to emerge later in the season, after the herbicide has ceased to be effective. These late-emerging weeds may or may not be harmful to the crop depending on the weed species involved, the crop's competitive response and harvest requirements.

Weed resistance to herbicides

There are no known cases of weed resistance to herbicides that can be attributed to the use of lower-than-label rates. All cases of resistance reported so far have been linked to full or excessive application rates. The use of herbicides with different modes of action and mechanical weeding are the best strategies for preventing resistance.

CONDITIONS FOR SUCCESS WHEN USING LOWER-THAN-LABEL RATES

Adequate crop management

The first step in ensuring the success of a weed management program is making **efficient crop rotations** and adopting **cultural practices** that favour the crop over the weeds, such as late seeding and the use of competitive cultivars.

Field scouting

A good scouting program is indispensable for efficient weed control, whether growers are using lower-than-label or full application rates.

Growers should visit their fields regularly in the fall and spring and note any **weed infestations** as well as which **weed species** are actually present in order to determine whether treatment is necessary, to choose the appropriate herbicide and to take timely action.

After a preemergence or early postemergence treatment is applied, **the treated fields should be checked every week**. This way, if the control is not satisfactory, further action can be taken at the appropriate time.

As a rule, the smaller the weed seedling the easier it is to control. Lower-than-label rates should not be used on weed populations that are too heavy, too well-established or too difficult to destroy even with a full application rate.

Choosing the right herbicide

Growers should choose the herbicide best suited for the target weed population, taking into account the species involved as well as their density and development stage. Products with different modes of action should also be used alternatively according to current recommendations so as to avoid the development of herbicide resistance in weed populations.

Effective spray application

For good results with lower-than-label rates, it is important to have a good knowledge of herbicide spraying and to meet all the conditions necessary to ensure maximum treatment efficacy.

FIND OUT WHAT WORKS BEST FOR YOU

Growers cannot simply adopt their neighbours spraying program, because of potential differences in weed species, soil types, crop management and equipment.

OTHER MEASURES THAT CAN REDUCE THE IMPACT OF HERBICIDE OF ENVIRONMENT AND HEALTH

There are a number of ways than the use of lower-than-label rates that can help reduce the amount of herbicide applied on field crops and their associated risks.

These include **band or spot (localized) treatments**, leaving **untreated buffer zones** for protecting sensitive areas, **spray drift reduction**, use of

The **sprayer** must be in good working order. This includes checking that the agitator is working properly, the nozzles are giving a uniform spray rate, the sprayer is delivering the correct pressure range, and the height of the spray boom is set to achieve an overlapping and uniform spray pattern.

The **spray mixture** must be properly prepared (using the right amount of water, active ingredient and, when applicable, adjuvant) and applied in such a way as to yield the right volume of liquid per hectare. Note that the amount of adjuvant must be adjusted to the amount of water, rather than to the quantity of herbicide applied.

Weather conditions during the treatment must allow the herbicide to retain its efficacy and reach the target. Too low or too high a temperature may reduce the product's effectiveness, and strong wind may cause drift.

Lastly, both the crop and the weeds must be at the **recommended stage** for treatment.

Mechanical weed control

Efficient mechanical weeding substantially increases the likelihood of success in the use of reduced herbicide rates. Studies on corn have shown that, under proper conditions, the preemergence application rate can be reduced by half if the treatment is completed by mechanical weeding, without decreasing yields or leading to buildup of the weed population later on.

Use of local resources

A number of resources (group advisory services, agricultural consultants, printed guides, etc.) are available to help growers switch toward more environment-friendly production and avert problems. An ounce of prevention is worth a pound of cure!

Furthermore, the herbicide that works best for one grower may not be the best choice for another. Each farm and each field must be considered on a case-by-case basis to select the strategy that will yield the best results.

the **minimum rates specified on the label, proper pesticide storage and handling, and recycling of empty pesticide containers**.

For more information on these practices, refer to the *Guide des pratiques de conservation en grandes cultures*, first published in spring 2000 and available through Distribution Univers at 1 800 859-7474.

IPM: THE KEY TO SUCCESS IN CROP PROTECTION

Integrated pest management, which is advocated in Quebec under the Stratégie phytosanitaire, is a decision-making process that uses all necessary techniques to suppress pests effectively, economically and in an environmentally sound manner.

A complete and well-structured IPM program involves six steps:

- identifying friend and foe,
- monitoring and evaluating the situation,
- using action thresholds,
- managing the ecosystem in order to make it less sensitive to pests,
- integrating available control methods,
- evaluating the efficiency and consequences of actions taken.

This factsheet is simply an update of the document prepared and first published in February 2000 by Raymond-Marie Duchesne, Pierre Lachance and Michel Letendre of MAPAQ, in collaboration with PMRA, CPI and RAAQ (that later became La Financière agricole du Québec) for the Lower-Than-Label Rate Working Group set up under the Stratégie phytosanitaire (Quebec's pesticide reduction strategy).