



# Integrated Weed Control Management for Sustainable Agriculture

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## DESCRIPTION

Weeds generate more agricultural output losses than other agricultural pests on a global scale. "Estimates on potential and actual losses despite current crop protection practices are given for wheat, rice, maize, potatoes, soybeans, and cotton," Oerke wrote in a systematic review of the evidence on crop production losses. "Weeds produced the highest potential loss (34 percent), with animal pests and pathogens being less important (losses of 18 and 16 percent)". As a result, weeds are a constant source of frustration for farmers. Crops are harmed when they compete for soil nutrients, light, and water. They're especially troublesome when crops are directly planted by machine or when tillage is minimal. They also place restrictions on farmers' time and effort, and they are a significant output cost.

To manage weeds, integrated weed management incorporates many agronomic methods, reducing dependency on a single weed control strategy. Reducing reliance on one or two unique weed management strategies or instruments ensures that such techniques or tools will continue to be successful in the future [1]. The goal of integrated weed management is to keep weed densities under control while preventing weed populations from shifting to more difficult-to-control weeds. Weed losses will be reduced while agricultural revenue remains same. Herbicides are now used by the majority of farmers. Toxic residues hurt both humans and environment, and many plants develop resistance to chemical chemicals, thus sustainable agriculture and organic farming demand a major rethinking of the method. Alternative and integrated weed control programmes are the most effective option in this respect, with a future in mind.

A weed control approach based on a combination of preventative, cultural, mechanical, and chemical methods is known as Integrated Weed Management (IWM). Due to the large number of distinct weed species and their very complex life cycles and survival tactics, a single weed management method is not possible. Furthermore, managing weeds with only one or two approaches allows the weeds to adapt to the techniques. In essence, an IWM programme is built on a few broad ideas that

may be applied to every farm: (1) apply agronomic methods that restrict the entry and spread of weeds (preventing weed issues before they start), (2) assist the crop compete with weeds (help 'choke out' weeds), and (3) use practices that keep weeds 'off balance' (do not allow weeds to take over the field) [2].

## Methods of weed control

Weed control in agricultural areas is divided into five categories based on the events and strategies used. The following are the details.

**Preventative weed control:** This management strategy seeks to keep planting materials and farmed areas free of weeds. It entails purchasing weed-free seeds, washing equipment, inspecting livestock's hair and legs, screening irrigation waters for weed seed transportation, and preventing seed germination using totally rotted compost and manure.

**Cultural weed control:** It assures that non-crops have a harder time establishing themselves in the field. Planting high-adaptive and competitive species; choosing large seeds that are likely to produce vigorous and lively plants; crop rotation; field fallowing; use of cover crops; decrease of space between rows; shallow seeding are all part of the management strategy (thus, crops can grow faster than other herbs).

**Mechanical weed control:** This management strategy entails physically or with agricultural equipment killing undesired plants. Plowing, tilling, mowing, manual pulling (hand removal), burning, mulching, and covering space between rows are all used in this area of management (for example, with straw).

**Biological weed control:** Plant enemies are used to control weeds in their natural ecosystems. Tansy ragwort is destroyed by sheep, tansy flea beetles, and cinnabar moths. Another example of a management strategy is grazing. Pathogen organisms such as bacteria and fungi that attack certain species are also used in biological control. They are numerous and cause harm to many sections of the body (leaves, stems, seeds, roots).

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**Chemical weed control:** This method entails using industrial chemical treatments to eliminate weed infestations. Despite the fact that this method produces speedy results, it is harmful and harms creatures and natural resources. Another issue is herbicide resistance and ineffectiveness as a result. Chemical uses, on the other hand, include expense inputs, especially if they are employed often. As a result, herbicides with diverse modes of action and different mixtures must be used. It's critical to follow the directions on the label. The proper application of herbicides and fertilizers, as well as their timing, is an important part of chemical management. They are useful if used at the right time in the plant's growth [3,4].

The easiest approach to keep weeds out of your fields is to keep them out. Field sanitation refers to techniques that keep weeds out of your fields and prevent them from spreading. Good field prevention strategies include using clean seed (certified seed), clean equipment, and tarping grain cargoes. This will lessen weed pressure in your fields and the introduction of new and/or harmful weeds. Weed control in ditches, along the borders of fields, and around sloughs is a critical step in preventing the

spread of weeds like Canada thistle and scentless chamomile. To inhibit the spread of new invading weeds or herbicide-resistant weeds, control patches of them. To inhibit seed establishment, small areas should be mowed or treated with a suitable herbicide (Roundup) after the typical spraying time [5].

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