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RESEARCH ARTICLE

Weeds in agricultural and non-agricultural systems: Media influence, impacts and trends for a better systematic control against alternate and collateral hosts of crop pests

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Abstract

Weeds significantly impact agricultural productivity and environmental health by competing with crops for resources and acting as alternate hosts for pests. This study uniquely combines an ecological inventory with quantitative assessments to address weeds' role in various ecosystems, including agricultural and non-agricultural areas such as roadsides and industrial sites. Methods included field surveys, species identification and indices like informant consensus factor (ICF) and use value (UV) to measure weed prevalence, competition and adaptability. Results highlight that species like *Cyperus rotundus* and *Echinochloa spp.* pose substantial threats, causing up to 70% yield loss in specific regions, particularly in tropical irrigated crops. Additionally, weeds cause water loss, soil depletion and habitat disruption in non-agricultural zones. This study emphasizes the need for integrated control strategies, combining cultural, mechanical and chemical approaches. Media influence is also discussed, stressing its role in public perception and policy development for sustainable weed management. This work provides novel insights for enhancing agricultural resilience and environmental sustainability through improved weed control.

Keywords

farming; integrated management; mass media; non-agricultural areas; weed

Introduction

Weed is any undesirable and unwanted plant that interferes with the use of edaphic, water resources with a cultivated plant and/or man. It is therefore a plant that is where it should not be, a plant that is present and growing where we rather want to have another instead or no plants at all. Weeds are therefore an important factor in the management of edaphic and water resources and their effective impact on agriculture is high.

There are no global studies yet to show their impact. However, it is widely known that the annual production losses caused by weeds (1-3) far exceed those caused by any other categories of agricultural pests such as insects, nematodes, pathogens, mites, birds, rodents and abiotic stresses (4-6). Accordingly, yields and incomes registered in agricultural production are low (7-10), despite lots of efforts (11) in management to reach the expected yield.

Adverse effects of weeds

Reduction or loss of crop yields

Weeds compete with crops for nutrients (especially nitrogen), light, water, moisture and space (12-18). The intensity of the competition depends on the weed species, the severity of its infestation, the duration of the ability of the cultivated plant to withstand the competition and finally the climatic conditions that influence the growth of the weed and the cultivated plant.

There is a direct correlation between yield loss and competition due to weeds. Generally, the 1 kg increase in weed growth corresponds to a 1 kg reduction in the yield of the cultivated plant. Weeds make better use of soil nutrients than cultivated plants, many of which grow even faster than cultivated plants (19, 20). Undisturbed, they can go so far as to inhibit crop tillering and branch production and affect photosynthesis and plant production.

Depending on the degree of competition, yield losses can range from 10-70%; sometimes it can reach even 100% (18). In India, for example, total weed control can add about US$5 trillion to its economy; in the United States, weed control exceeds more than US$20 billion (21, 22). Yield losses due to weeds are higher in the tropics. In Asia, for example, weed control can increase yield by about 70% in irrigated areas (23). Under extreme conditions, effective weed control can triple rice yield.

Reduction in the market value of land

A strong infestation by perennial weeds can affect the possibility of using a piece of land for agricultural purposes, thus reducing its monetary value. Millions of hectares of Asian rice perimeters have been abandoned due to severe infestations of *Cyperus rotundus, Cynodondactylon* and *Imperata cylindrica* (24-26).

Limit of choice of culture

Cultures differ in their ability to withstand competition (27, 28). In many cases, the presence of a weed species will dictate the choice of cultivated species. A strong presence of weeds makes some economic crops less profitable (especially legumes, vegetables and cotton).

Deterioration of product quality

Most vegetable crops suffer from the presence of biotic stresses (1, 27, 29-31) like weeds. The presence of seeds and weed debris in harvested products significantly reduces their quality and market price.

Increased costs of controlling diseases and pests

Weeds serve as alternate or collateral hosts for many insects, nematodes and pathogens. Insects such as aphids, thrips, mealybugs, whiteflies, weevils and drillers survive on spontaneous grasses (the same is true especially for maize, rice, sorghum, sugarcane, etc.). In the following season, the crops are invaded by these insects and pathogens, which increases the cost of control.

Interference with human life

For example, reduced comfort, allergies related to irritating plants, thorns that may be present and so on.

Aquatic weeds pose major problems for water Weeds remarkably reduce the flow of water into canals and other pipes during irrigation and drainage (obstruction of pipes) with all the difficulties that this implies for the delivery of water to plots located at a great distance from the source, plus pipe maintenance work.

Weeds cause too much water loss through transpiration, clogging all the structures for regulating water regimes in hydro-agricultural devices. In addition, they cause a decrease in navigability, the penetration of light into the water, reduction, or disruption of flow and so on.

Some species of aquatic weeds include *Eichornia crassipes, Typha angustifolia, Hydrilla verticillata, Potamogeton* spp*., Salvinia molesta, Ipomea aquatica, Nymphea* spp. and *Pistia* spp. (44) (Table 1).

Biology and weed propagation

Understanding weed species, their geographic distribution, growing habitat and population dynamics of weed species and their community is of great importance (32, 33). The development of an effective and adapted management program depends on knowledge of the biology of the species present in the environment.

Distinct from their lifespan, annual and biennial weeds generally depend on their seed production as the only means of propagation and survival. The abundant production of small seeds represents their adaptation which gives them a high probability of dispersal and re-infestation. A single plant of *Bidens pilosa* can produce more than 500000 seeds. Many weeds can produce enough viable seeds even when they have been cut shortly after flowering. Perennial weeds are usually propagated vegetatively (rhizome, stolon, tubers, bulbs, cuttings, etc.), but most also produce seeds in abundance.

Weed ecology

One of the best paths to good weed management is understanding the interrelationship between an organism and its environment (32, 34), i.e., the characteristics of weed growth and adaptations that allow it to survive changes in the environment.

Weeds as medicines

Weeds have traditionally been viewed as unwanted plants in agricultural and landscaped environments. However, recent ethnobotanical studies reveal that many of these so-called weeds have significant medicinal potential, especially within indigenous and rural communities worldwide. These communities often rely on wild flora, including weeds, for basic healthcare, highlighting the importance of weeds in traditional medicine. In places like Palas Valley of Kohistan, Shawal Valley in North Waziristan and regions across the Kashmir Himalayas, weeds are frequently utilized for their therapeutic properties, forming an essential part of local healthcare practices (35-38).

In regions like Palas Valley, rapid appraisal approaches and interviews reveal that local communities use 102 medicinal plant species, many of which are wild herbs, to treat common ailments. These plants, often considered weeds, provide a valuable source of natural remedies and their use underscores the indigenous knowledge of botanical resources for health purposes (35). In Shawal Valley, a similar reliance on wild plants is evident, with communities documenting over 100 species used for medicinal purposes. Here, the importance of weeds is further illustrated by their use in treating digestive disorders and respiratory conditions, highlighting the broad application of these plants in traditional healthcare (36).

Furthermore, studies from the Kashmir Himalayas emphasize that many weeds serve as primary healthcare

Table 1. The most encountered weed species. There are more than 250000 species in the world of which about 250 are considered the main weeds or weeds in the agricultural and non-agricultural system. They cause enormous difficulties to human life by reducing the quality and quantity of agricultural production and by seeking solutions to the problems they cause. Most are persistent and need to be controlled (44)

Species	Categories	Distribution	Control means
*Echinochloa*spp.	Annual grasses widely distributed around the world	The most encountered anywhere in the world	Pre-emergence: chloramben, atrazine, simazine, diuron, liuron, metolachlor, consulfuron, imazaquine, fomezafen
Eleusine Indica	Annual grass, difficult to fight	In semi-arid areas	The best fight to fight it is pre-emergence: simazine, atrazine, liuron, diuron, oxychlorofen and monuron. Post emergence: paraquat gives good results
Euphorbiahirta	Annual grass	Tropical and subtropical areas in old environments, many crops, roads...	Methods such as weeding with hoeing, weeding effectively give good results: atrazine, urea derivatives.
Imperatacylindrica	Indian grass, one of the most dangerous herbs in the world, rhizome reaching a great depth	It can be found in several countries of the world: itis difficult to eradicate in a culture environment	Post-emergence: paraquat with a lot of repetitions. Systematic herbicides such as glyphosate, dalapon.
Lantana camara	Perennial grass	Tropical, subtropical and temperate, very dangerous in the world	Foliar sprays are less effective because there is a possibility of emergence; hence the use of the systemic herbicide.
Oxalis corimboza	Perennial grass	Miscellaneous environment	Mechanical destruction cannot eradicate the species, but deep ploughing can eradicate the species. Need for herbicides in pre-emergence: diuron, oxyfluorfen, oxadiazon.
Ageratum conyzoides	Tropical annual grass	Tous les environnements (routes, champs)	Manual methods, treatment with simazine, atrazine and diuron in pre-emergence; post-emergence: 2,4-D.
Amaranthus viridis, A. spinosis	Annual herbs	Field of cereals, peanuts, cotton and different other crops	Simazine, atrazine, oxyfluorfen, oxadiazon, alachlor (pre-emergence); Imazaquin, paraquat, imazethapyr (in post-emergence).
Bidens piloza	Annual grass	In tropical environments	Pre-emergence: Simazine, atrazine, diuron; in post-emergence: 2,4-D.
Chenopodiumsp.	Annual grass	Widely distributed	Pre-emergence: metolachlor, propachlor, chlorbromuron, chloramben, alachlor. Post-emergence: paraquat, diclofop, dinozeb, betazone.
Commelinabughalensis, C. diffusa	Perennial grass. It reproduces by seed and rhizome with deep rooting	Grasses of a strongly humid environment with waterlogged organs, in the fields of legume crops, banana plantations, etc.	It is a species resistant to many herbicides. Soil-level treatment gives better results than foliar sprays; the most widely used herbicide is glyphosate.
Cyonodondactylon	Perennial grass	Tropical, subtropical, semi-arid regions	Pre-emergence: the diuron Post-emergence: dalapon, glyphosate
Cyperus rotundus	Very persistent perennial grass	Found in 52 crops in 92 countries, in the tropical and subtropical zone	Soil treatment with imazaquine, or chlorimuron in pre-emergence; Post emergence: chlorumuron and imazethapyr.
Digitaniavestida	Annual grass	It is found in tropical and temperate climates; it produces many of the seeds with the possibility of spreading vegetatively	Pre-emergence: butylate + atrazine; alachlor + diuron; alachlor + chloramben; Post-emergence: nicosulfuron, bromoxynil
Panicum sp.	Perennial grass very aggressive and difficult to fight because of the production of rhizomes	In tropical environments	Difficulty also to eradicate it as*Imperata*, we need systemic herbicides
Paspalum notatum, Pennisetum purpureum	Grass with vegetative production difficult to control by mechanical methods	Everywhere in the world	The application of paraquat gives good results but it faces the problem of re-emergence, hence the use of systemic herbicides or the mixture of two.
Solanum nigrum	Nightshade	In cultural regions	Glyphosate
Strigalutea	Parasite of cereal crops	Can grow in any environment	Pre-emergence: simazine, atrazine, linuron, diuron, monolinuron; Post emergence: paraquat

sources due to the inaccessibility of modern medical facilities. Among these plants, herbs are particularly prominent, with a high reliance on leaves, roots and whole plant parts in medicinal preparations. Decoctions and teas, often made from common weeds, are a frequent remedy for digestive and respiratory issues in these areas. The frequent use of these plants reflects their cultural and medicinal significance, positioning weeds as crucial components of the indigenous healthcare system (37, 39)

In light of these findings, it is essential to preserve and document the traditional knowledge of weed use as medicinal plants, as this knowledge is often at risk of being lost due to modern development and shifting cultural practices. Studies indicate that younger generations are increasingly disconnected from these traditional practices, which necessitates urgent documentation and conservation efforts. Weeds not only contribute to biodiversity but also hold untapped potential for future pharmacological research. By exploring the medicinal value of these plants, researchers may uncover novel compounds for drug development, which could serve both local communities and broader scientific interests in medicinal plant research (38, 40).

The role of weeds as medicinal plants in traditional healthcare systems is vital and irreplaceable. These plants support local healthcare needs, particularly in remote and resource-limited regions, where access to conventional medicines is scarce. By advancing ethnobotanical studies on weeds, researchers can both safeguard indigenous knowledge and contribute to the global repository of medicinal resources for healthcare innovation.

Persistence and survival mechanism

It refers to the measurement of the adaptive potential of a weed that allows it to grow in any environment. It is largely influenced by climatic factors such as temperature (variation, max and min), precipitation (quantity and distribution), insolation (light intensity, duration of sunshine) and wind (speed and direction), edaphic factors such as soil structure, texture and temperature, field capacity, aeration, soil pH, soil fertility and biotic factors including plants and animals that play a diverse role in weed growth (41-44).

Weed survival mechanisms include abundant seed production, survival of vegetative reproductive organs during adverse conditions, seed spread and dormancy and their ability to withstand environmental changes; the dissemination of seeds, weed seeds are great travellers to be transported by various agents (wind, water, animals, man ...); germination and dormancy of seeds: not all seeds from even a single plant germinate at the same time. Many weeds persist from their long-dormant seeds; vegetative multiplication is due mainly to deep rooting and the presence of a high number of dormant vegetative organs (45-47).

The weed-desirable plant competition

Competition here involves two or more organizations looking for a particular factor when it is insufficiently supplied. Weeds affect the growth and yield of plants grown from competition through nutrients, water and light. As a rule, each unit of growth of a weed corresponds to a unit of reduction of the cultivated plant (48).

Media plays a significant role in shaping weed control policies

Media has the power to set the agenda for public discourse (49). By highlighting certain issues and downplaying others, media can influence the policy decisions taken by governments and other public institutions. For instance, media outlets can bring attention to the impact of weeds on agricultural productivity and biodiversity, prompting policymakers to prioritize weed control (44, 49).

Media serves as a primary source of information for the general public (49). It provides news, analysis and updates on political events, policies and debates. Media outlets have the power to shape public opinion by choosing which stories to cover and how to frame them (49, 50). This can lead to increased public support for certain weed control policies (Table 2).

The media acts as a watchdog, monitoring the actions of politicians and government institutions (49). Journalists investigate and report on cases of corruption, malpractice and misuse of power (49, 50). Exposure to media coverage often leads to public outrage, protests and legal actions, forcing politicians to be more transparent and accountable (50). This can result in more effective and fair weed control policies.

Multiple approaches to integrated weed control

In weed control, the main goal is to maintain a less weed-prone environment by using one or more methods, alone or in combination, as a preventive or curative (Fig. 1). Reducing the effects of weeds to an acceptable level therefore means that their control does not automatically mean their eradication (44). The degree of undesirability of weeds will therefore depend on their harmfulness to the cultivated plant. It is tolerable up to a threshold beyond which the struggle will prove necessary.

Traditional methods

For a long time, before chemical control became the dominant force in weed management, farmers used traditional approaches such as manual (7), mechanical (26, 51-53) and cropping (17, 54) to control weeds for centuries. With the availability of herbicides (especially after 1940) for each weed and their spectrum of use for each herbicide, most traditional practices and weed management have been overshadowed. Among these traditional methods are the prevention of 'Weed-free crop seeds' infestation, seed certification, seed purity, legislation on pests and diseases in general and weeds and quarantine for certain weed species. All in all, time is the most important parameter (30, 55).

Eco-physiological approaches

Ecological components that have an impact on weed physiology include light, water stress, temperature (13), soil solarisation (56), CO_2 atmospheric concentration (13, 57), mineral nutrition and the cropping system (rotation, crop association, more competitive species and varieties, cover plants).

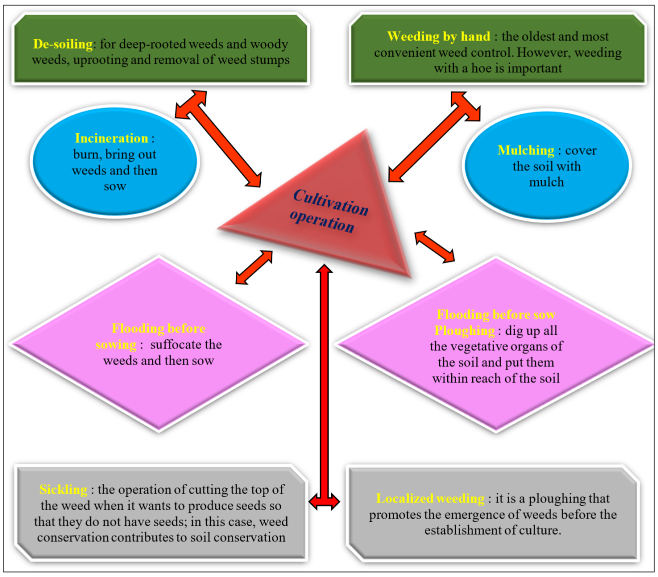

Fig. 1. Post-infestation management measures, including control and eradication measures.

Table 2. Impact and media influence on different types of weeds in agricultural and non-agricultural systems

Weed type	Impact on agriculture	Impact on non-agricultural systems	Media influence
Broadleaf weeds	Can compete with crops for resources, reducing yield.	Can invade lawns, gardens and natural areas, disrupting ecosystems.	Media campaigns can increase awareness about control methods and the importance of managing these weeds.
Grassy weeds	Can reduce crop quality and yield and can host pests and diseases.	Can outcompete native grasses and alter habitats.	Media can highlight the economic and environmental impacts of these weeds and promote effective control practices.
Sedge weeds	Can severely impact crop growth and yield, especially in wet conditions.	Can dominate in wetlands, displacing native species.	Media can educate about the unique challenges posed by these weeds and the need for specialized control strategies.

In the crop-weed system, light plays the role of regulating growth and development and even competition between the two. The plant response varies depending on the amount of light, duration of light, the quantitative spectrum of light and its fluctuations. The amount of light intercepted by weeds is a major determinant of their growth. Manipulating the amount of light intercepted by their canopy can significantly reduce their degree of harm; water stress reduces photosynthesis by interfering with chlorophyll synthesis, electron transport, synthesis and activity of carboxylation enzymes; temperature governs the seasonal growth of weeds and their geographical distribution. For example, at daily and night temperatures of 18°C/12°C and 24° C/12°C, respectively, maize grows faster than any weed and thus stifles its growth (Fig. 2); soil solarisation is also based on high temperatures preventing the germination of weed seeds; the concentration of CO_2 in the atmosphere affects the crop well as the weed, directly or indirectly. C_3 plants generally use more CO_2 than C_4 plants, which has an impact on plant-weed competition, as most weeds are C_4 plants, while many of the plants grown are C_3 plants (42, 43, 45, 46).

Fig. 2. Maize field full (A) and free (B) of weeds

However, in a crop-weed system, the application of nutrients is generally more beneficial to weeds than to cultivated plants, because of their ability to mobilize even small reserves available to them as quickly as possible. Strategies to reduce competition for nutrients include application methods, application time and alternative sources of nutrients such as crops and weeds that respond differently to different types of fertilizers (42, 46). The use of more competitive crops and varieties reduces the invasion of the main crop by weeds. A vigorous, fast-growing plant takes advantage over weeds that take time to emerge. They perform better competition through nutrients, sunstroke, soil organic matter and CO_2. The most competitive plants include cereals such as maize, sorghum and soybeans. Crop rotation is so necessary because the continued exploitation of the same species can promote the proliferation of weeds associated with it. Although crop combination is practiced to maximize land use and yield, it has a significant effect in suppressing weed growth. Cover crops can also be used on heavily infested fields and thus clear the soil for food crops to be planted in subsequent seasons. In addition, there is a possibility of smothering weeds with a high density of crops. Products that stimulate the growth and germination of weed seeds can also be used to better control them, such as ethylene and nitrates.

Chemical method

Control is based on the use of herbicides (58, 59), with globally about 513 herbicide-resistant weeds reported (60). Total, absolute, or radical herbicides can kill all plants indiscriminately, while selective herbicides are used for the destruction of weeds causing little or no damage to the crop plant. A total herbicide can become selective when the dose of use is lowered; similarly, a selective herbicide will become total if the normal dose of use is exceeded (61, 62). Contact or contact herbicides destroy the plants and parts of plants on which it is applied. Pre-emergence herbicides, the application of which is carried out after sowing the cultivated plant but before its emergence. Pre-emergence can be contact, that is, the product kills the weeds on which it is applied but the toxic action is of very short duration, being quickly evaporated or transformed into non-toxic substances, or residual, that is, when the product persists on the soil for a long enough time to kill the weeds at the time of their germination or emergence. Post-emergence herbicides are carried out after the emergence of weeds and cultivated plants. Thus, herbicides can be organic (petroleum and synthetic) or inorganic.

Field weed management

All plants grown in the field are subject to competition due to weeds. The weed problem varies from one crop to another, from one region to another, from one farm to another or even from one corner of the field to another. Weeds grow intensely in wet, rainy and dry regions. However, they adapt to extreme climatic conditions as they are always in competition with plants grown in any situation. Weeds and their control are as old as agriculture itself. Manual and mechanical methods have always been the most widely used (63, 64) and the oldest (65), particularly in developing countries.

With the introduction of herbicides, weed management has become more efficient and more economical in terms of time and financial means. However, the use of herbicides should not exclude the use of mechanical and/or manual methods and cultivation practices (66) in weed control. Note that competition due to weeds is maximum during the first stage of growth of the plant. However, the critical period varies from culture to culture. A few of the crops below serve as examples of weed management in the open field. Currently, the use of herbicides and tillage to remove weeds are the two most combined practices, unfortunately presenting significant negative environmental impacts (67).

Cases of cereals and oilseeds

Competition due to weeds is usually more pronounced for the direct sowing case than for transplants. Yield losses from weeds for cereal crops (especially rice, maize, wheat, sorghum and millet) often range from 30-65% (68, 69). The most common weed species are grouped in genera like *Echinochloa, Commelina, Cyperus, Panicum, Ageratum, Euphorbia, Setaria, Digitaria* and *Crotalaria*.

In crop control, manual, mechanical and cultural methods give good results but are economically profitable only in small areas. In large areas, this previous approach becomes difficult, hence the use of herbicides.

Yield losses due to weeds in a groundnut field can be as high as 80% (70). Manual weeding is effective for weed control. In rainy conditions, weeding is not a satisfactory method because it requires a certain regularity. For soybeans, leave the field one month free of weeds; a month later, sowing significantly gives the same yield as if it were kept throughout the season. Mechanical and manual methods are excellent control measures

(71, 72). Unfortunately, they are only applicable when weeds are not already established and their damage may already be noticeable; hence the need for pre-emergence struggle (Table 3).

Case of sugarcane, tobacco, banana, potato and sweet potato

For sugarcane, the critical moment of the competition is between the 4th and 5th months during tillering and the elongation phase. This has a direct impact on the yield and sugar content of the juice. In pre-emergence, control is effective for 8 to 12 weeks. There is a direct negative correlation between weed population and machinable cane, yield and sugar content. From time to time mechanical control can offer moderate efficiency, hence the use of the combination of mechanical methods and herbicide application is necessary to check the weed growth. Weed competition affects both the yield and quality of tobacco. The orobranchial species is the most predominant. Tobacco is sensitive to many post-emergence herbicides, hence the need to use a lot of pre-emergence herbicides. Potatoes are grown on fertile soils rich in organic matter, hence the permanent presence of weeds that cause serious problems. It emerges even before the establishment of culture. Their competition affects the number of tubers and their size and can introduce yield losses of up to 50%. When a potato field is kept weed-free for the first 4 weeks after planting, there is no significant reduction in yield. Fast-growing sweet potato varieties suffer very little from competition due to weeds. However, the critical period is 8 to 12 weeks after planting; thus, the best control is obtained by a pre-emergence treatment. As the afterglow takes 8 weeks, there is no post-emergence application because the cover of the crop inhibits the growth of weeds (73-80).

Herbicides that give good results pre- and post-emergence are discussed (Table 4).

Case of vegetables

Generally, vegetables are weak competitors to weeds. The slightest competition has a significant effect on the yield and quality of the product at any stage of growth. Manual weeding is widely practised in vegetable cultivation, especially in developing countries. Vegetables represent a varied group of species where the use of herbicides may not have a prominent place. In pre-emergence, substances such as napronamide (1-2 kg/ha), pronamide (1.5-3 kg/ha), dephenamine (2-3 kg /ha), oxyfluorfen (0.25-1 kg/ha) and thiazopy (0.5-1.5 kg/ha) give a good result for a wide range of weeds. In post-emergence, the product fluazifop (50-100 g/ha) is highly effective. Even though these herbicides are usable for all vegetables in general, the selectivity for each vegetable has yet to be determined (81, 82).

Weed control in non-agricultural systems

Aquatic systems

Aquatic weeds are plants that grow on the surface of waters where they are undesirable. It is the algae with around 100 families of hydrophytic species that can live on water surfaces. Some frequently encountered species are the species of the genus *Nenuphar, Myriophillum, Polygonum, Pistia, Eichornia* and *Nymphea* (44). The means of control consist either of a decrease in the population of weeds or of eradication according to the degree of undesirability of the effects they cause.

Other means of control include mechanical methods such as the use of ropes attached to boats, biological methods such as the use of fish or other animals and the application of herbicides which are faster and more accessible by economic means. However, herbicides pose residue problems in non-agricultural areas (83)., including the aquatic environment. As a

Table 3. Control of cereal and oilseed weeds through chemical control

Crop	Pre-emergence	Post-emergence
Rice	Thiobencarb (1-2 kg/ha); Butachlor (1-2 kg/ha); Oxadiazinon (1-1. 5 kg/ha); Pretilachlor (0.5-1 kg/ha); Bensulfuron	Acifluorfen (0. 5-1. 5 kg/ha); Bifenox (1. 5-2 kg/ha); Trichlorpyr (0. 2-0. 4 kg/ha); Quinclorac (0.2-0.4 kg/ha)
Wheat	Linuron; Diuron. 2,4-D should be avoided at the young stage of wheat.	2,4-D; Picloram (0. 25-0. 5 kg/ha); Fluazifop (0. 25-1 kg/ha); Tribenuron (10-20 g/ha)
Maize	Atrazin (1-2 kg/ha); Simazin (1-2 kg/ha); Alachlor (2-3 kg/ha); Acetochlor; Dimethylamide; Metholachlor; Oxyfluorfen; Imazaquin	Primisulfuron; Prosulfuron (50-60 g/ha); Imazaquin (can also be used in post-emergence)
Sorghum	Propazin; Atrazin; Alachlor; Isoproturon; Metolachlor	Prosulfuron (15-30 g/ha); Trifluralin (0.8-1.2 kg/ha)
Peanut	Metolachlor (1.5-3 kg/ha);Pronamide (1.5-3 kg/ha); Thiazopyr; Imazethapur (50-70 g/ha)	Acifluorfen; Imazaquin; Fluazifop (50-100 g/ha); Imazethapur (30-50 g/ha); Chlorimuron
Sunflower	Bifenox (0.5-1 kg/ha); Promamide (1.5-3 kg/ha); Thiazopyr (0.5-1.5 kg/ha)	Imazaquin
Soybean	Metolachlor (1.5-3 kg/ha); Pronamide (1.5-3 kg/ha); Thiazopyr (0.5-1.5 kg/ha); Imazethapyr (50-70 g/ha).	

Table 4. Herbicide control of weeds in sugarcane, tobacco, bananas, potatoes and sweet potatoes

Crop	Pre-emergence	Post-emergence
Sugar cane	Atrazine (2-3 kg/ha); Ametrine (2-3 kg/ha); Alachlor (1.5-2.5 kg/ha); Metoxuron (4-6 kg/ha); Diuron (1.5-2.5 kg/ha); Metribuzin (1-1.5 kg/ha); Imazapyr (4-10 kg/ha); Fluometuron; Thiazopyr (1-2 kg/ha)	Prosulfuron (15-40 g/ha); Halosulfuron (30-50 g/ha); Glyphosate (0.8-1.6 kg/ha) very effectively controls many perennial weeds; Paraquat (0.4-0.8 kg/ha) vs . *Cynodondactylon, Cyperus rotundus*
Tobacco	Imazapyr; Diphenamide (2-3 kg/ha); Trifucaline	Glyphosate
Banana	Atrazine; Simazine; Diuron Linuron; Thiazopyr, Fluome, Turon	Paraquat; Dalapon; Glyphosate; 2,4-D. The Diuron or simazine mixture with paraquat makes it possible to extend the period or duration of control.
Potato	Linuron; Methabenz&Thiazuron (0.75-1.25 kg/ha); Butachlor (1.5-2.5 kg/ha), Oxyfluorfen (0.1-0.3 kg/ha), Amilophos (0.4-0.8 kg/ha); Diphenamide (3-4 kg/ha)	Paraquat (0.4-0.8 kg/ha) ; Propanil (1-1.5 kg/ha) ; Glyphosate (0.8-1.6 kg/ha)
Sweet potato	Vernolate; Diphenamide	

result, the use of herbicides with low toxicity and short duration of action. In aquatic environments, few herbicides can be used (72, 84), such as acrolein, amitrole, bensulfuron, 2,4-D, dalapon, diquat, paraquat, fluoridone, glyphosate, simazine and diuron may be recommended.

Other miscellaneous non-crop habitats

For the control of weeds in forests (85), near roads, railways and other conservation systems (86), the use of triazine, urea derivatives and uracil can work well. Also, paraquat, picloram, glyphosate and dicamba can be used. Furthermore, industrial sites, airports, open spaces in villages, sites and cities can sometimes be invaded by weeds that need to be controlled. The choice of one or the other herbicide, of the products already mentioned will depend on the specificity of the weeds to be controlled.

Prospects and outlooks

The exploration of media influence on attitudes, practices and policies related to the control of alternate and collateral hosts of crop weeds in both agricultural and non-agricultural systems presents promising prospects and perspectives. As technological advancements continue, media platforms will diversify, offering novel avenues to engage diverse audiences on weed management issues. Collaborative partnerships between researchers, media professionals, policymakers and agricultural stakeholders will be vital for developing evidence-based communication strategies tailored to weed control. Integrating stakeholder perspectives, particularly those of farmers and land managers, will ensure that media messages resonate and address specific challenges associated with weed management. Education and outreach efforts will play a crucial role in raising awareness about effective weed control practices, utilizing innovative approaches such as interactive media tools and community-based projects. Moreover, understanding the policy implications of media influence on weed management attitudes will be essential for shaping regulations and incentives that promote sustainable weed control practices. Embracing a global perspective in future research will allow for the exploration of regional variations in media influence, identifying common challenges and opportunities for advancing weed management strategies across diverse agricultural and non-agricultural landscapes.

Conclusion

Media influence on attitudes and practices related to weed management in agricultural and non-agricultural systems is significant and multifaceted. While media representations often emphasize conventional chemical control methods, there is a growing recognition of the importance of integrated weed management and sustainable agricultural practices in mitigating the impacts of pests on crops and ecosystems. With the environmental and biological problems created by some herbicides and the speed with which herbicide resistance is being created, especially around the last two decades, it has proved necessary to use traditional measures, in combination with other existing methods, especially biological and chemical courses. Since any plant can become a weed in special situations, we recommend the development of an integrated weed management program.

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Authors' contributions

AAK worked on the conceptualization, writing and preparation of the manuscript and produced the first format of the manuscript. SST helped in the incorporation of necessary corrections until final submission, supervision. S worked on the manuscript review and editing. BNS did conceptualization, manuscript review and editing, validation and supervision.

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