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# Crop Protection with Natural Products

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## Abstract

The development and widespread use of pesticides have contributed to the enormous increase in agricultural yields associated with the "green" revolution. New pesticide registration procedures, like the Food Quality Protection Act in the US, have been introduced as a result of worries about the possible effects of pesticides on human health and the environment. The quantity of artificial pesticides available in agriculture has decreased as a result of these new laws. As a result, it might be necessary to reevaluate the existing paradigm of relying nearly entirely on chemicals for pest control. To replace the compounds lost as a result of the increased registration requirements, new pesticides are being discovered and produced, including insecticides based on natural products. This overview discusses the historical applications of natural products in farming, their influence on the creation of new pesticides, and the possibilities for pest management with natural products in the future.

## Introduction

The development and use of pesticides for pest control have contributed to the success of contemporary agricultural techniques. In fact, without the assistance of these synthetic substances, the enormous increase in crop yields associated with the "green" revolution would not have been possible. Concerns regarding the availability of food in industrialised countries have all but vanished due to the abundance of high quality food in these countries. But as worries about the possible effects of pesticides on the environment have grown, stricter pesticide registration laws, such the Food Quality Protection Act in the US1, have been introduced. The quantity of artificial pesticides available in agriculture has decreased as a result of these new laws. Consequently, it might be necessary to reevaluate the existing paradigm of relying nearly entirely on pesticides for pest management.

Increased insecticides, including those based on natural products, are being developed to replace those that would be lost due to the new registration requirements. In order to stop pesticide resistance from developing, new insecticides are also required. This study examines how natural products have historically been used in farming, how they have influenced the creation of new pesticides, and what the future may hold for pest management using natural products [1]. We distinguish between substances that might be used in organic agriculture and those that might be used in conventional agriculture, but we also make clear that not all of the substances we describe in the sections on organic agriculture may be used for organic agriculture in all jurisdictions. The regulations governing what is permitted in organic agriculture differ between nations and even between states, and their inclusion or exclusion is not always supported by scientific evidence. In general, synthetic analogues of natural chemicals are not permitted in organic farming. To ensure that any substance they use is "certified" or approved as organic, organic farmers must check with their certification body or programme. Additionally, despite the fact that many organic farmers utilise biocontrol products (living organisms) for pest management, we do not include them. Most of the time, we don't bring up natural pest control products that aren't being used in agriculture. For this purpose, many natural chemicals have been identified and patented; but, for a variety of reasons, they are not yet commercially available [1,2].

## Natural management products for weed

The complexity of the carbon skeleton in natural products is the outcome of a biologically suitable "high-throughput" screening process to choose molecules. The word "highthroughput" refers not to the speed of the selection but rather to the countless combinations of very complicated structures that have been created over an incredibly long period of time by a very large number of biochemical machinery (organisms). Furthermore, since these substances are almost exclusively derived from secondary metabolic pathways, they are highly likely to have some biological activity against other organisms, frequently through novel mechanisms of action,2,16,17 which is crucial given how urgently new modes of action are required as pests continue to develop resistance to the currently available chemicals [3]. Managing weeds has been a significant issue for agriculture since it began. In actuality, uncontrolled weeds have a greater negative impact on crop production than any other agricultural pest. The majority of manual effort in traditional farming practices is used to manually weed fields. It should come as no surprise that the management of weeds in modern agriculture mainly depends on the use of synthetic herbicides. The effectiveness of synthetic herbicides has made this conceivable (active ingredient application rates can be as low as a gramme per hectare). 19 Numerous of these chemicals are both affordable to produce and have excellent crop selectivity. The majority of herbicides currently in use have little effect on the environment and wildlife, despite the fact that their use has drawn more and more criticism. Herbicides and other synthetic pesticides are not permitted in organic agriculture. Managing weeds effectively when using organic farming techniques is quite difficult. Although the majority of techniques rely on soil cultivation, hand harrowing, biocontrol, organic mulches, and ironically plastic (synthetic) ground cover, the use of some natural materials is allowed. The existing natural herbicides have little to no selectivity in comparison to synthetic herbicides, and they need to be used in rather high amounts. Additionally, there is a dearth of scholarly material on the application of natural goods in organic agriculture and their effects on the environment [2,4]. The byproduct of maize milling is gluten meal made from corn (Zea mays, L.). On lawns and high-value crops, it is marketed as both a fertiliser and a pre-emergence herbicide. The commercial goods, which go by a number of trade names, range in corn gluten content from 50% to 100%. The cost of controlling grasses and other weeds, however, is frequently prohibitive and calls for extremely high rates (such as 2 tonnes per hectare). Existing weeds are unaffected by corn gluten, but it has a wide range of impact on the germination and growth of young, emerging plants. Although their precise mode of action is unknown, these oligopeptides have an impact on nuclear development, cell wall construction, and membrane integrity. Given that it needs to be hydrolyzed to release the active components, corn gluten may be thought of as a slow-release proherbicide. Since many years ago, acetic acid [CAS 64-19-7] has been employed to eradicate weeds. For non-selective weed control, diluted aqueous solutions of acetic acid up to 20 percent are currently offered as horticultural vinegar or in combinations with other natural agents (see subsequent sections). A burn down, non-selective herbicide is acetic acid. It is therefore utilised in non-cropland regions including driveways, open space, golf courses, railway rights-of-way, and industrial locations. Most tiny weeds can be controlled to a better than 80% degree by acetic acid solutions (10–20%). However, employing the more efficient synthetic non-selective herbicide glyphosate (N-(phosphonomethyl)glycine) was more than ten times more expensive than spraying acetic acid to manage roadside plants [1,3]. Acetic acid destroys the aerial sections of plants but does not control the underground parts, as is typical with burn down herbicides. After a few days or weeks, plants usually reappear from the root system. Most commercial vinegars typically contain 5% acetic acid, and it has been found that this quantity offers only sporadic control of tiny weeds. Oil adjuvants do not considerably boost acetic acid's herbicidal efficacy. Despite being used at quite high concentrations, acetic acid does not have a long-term detrimental effect on soil microbes. Aquatic weed invasion can also be prevented by using acetic acid. Smooth cordgrass, sago pondweed, and hydrilla propagules are all killed by it. Careful acetic acid treatment of lake sediments may have utility as an alternative to foliarly applied herbicides such as imazapyr and glyphosate.

Since fatty acids have long been known to have herbicidal properties, some of their salts are now being sold as non-selective herbicidal soaps. These are made up of emulsifiers such organosilicone, saponified, methylated, and ethylated seed oil activator adjuvants mixed with fatty acids of varying aliphatic length and vinegar or acetic acid. Herbicidal soaps have a quick action and no selectivity (broad-spectrum weed control). However, because there is no residual action after the initial burndown impact, which occurs shortly after application, the majority of weeds tend to rebound. These mixes can therefore be employed as desiccants. The most efficient fatty acids are those with intermediate aliphatic tails, including caprylic (C8, octanoic acid), pelargonic acid (C9), and others.

The potential of essential oils as herbicides has also been demonstrated. It is frequently necessary to use surfactants, which are scarce in organic agriculture, to help in the material's spreading. It is challenging to discuss all of the different formulas because the majority of essential oils sold commercially for natural weed control are blends. Some of the most widely used oils will be highlighted in this section. All commercially available essential oils function as non-selective, contact herbicides (burn down) that are effective but only temporary at controlling weeds.

Although the use of essential oils for weed control in organic agriculture appears promise, the effectiveness of these natural herbicides is constrained by the fact that they all operate extremely quickly and most likely volatilize quite quickly. To lessen side effects, other formulations including microencapsulation are being created [5].

When used in conjunction with an integrated pest management strategy that includes multiple crop planting, extended rotation cycles, mulching, soil cultivation, and cover, the usage of organic weed control methods may be improved. However, none of the natural herbicidal substances permitted for use in organic agriculture are particularly active, therefore they must be used in rather large doses. This is in contrast to conventional synthetic herbicides. This could have negative impacts on the soil flora and bacteria, which would be in stark contrast to the aims and philosophies of those who engage in organic agriculture. The crop selectivity of these weed management technologies is also very low, and they still need arduous application techniques to make sure they don't come into touch with the intended crop.

Large-scale synthetic projects are the main drivers of the agrochemical industry's discovery initiatives, which are then followed by screening to find possible novel herbicides. The majority of businesses make less of an effort to assess natural items obtained from outside sources and, to a lesser extent, through internal isolation efforts. Although many phytotoxins have been characterised and isolated from various sources, and many of these compounds have been trademarked for use as herbicides, typical agriculture only uses a few number of natural or natural product-derived herbicides. Theophrastus (371-287 B.C.) described how pigweed hinders alfalfa growth. De Candolle, a Swiss botanist, proposed in 1832 that crop exudates might be to blame for the "soil sickness" that some plants grow in certain rotations. Fifty years later, it was discovered that black walnut trees had a negative impact on the growth of nearby vegetation. The phrase allelopathy, which was created from the two Greek words allelo and pathy and means mutual injury, wasn't coined for another fifty years. Later, Rice broadened this term to include chemically induced stimulatory and inhibitory effects of one plant (or microbe) on another (allelochemical) [2,3,5]. While allelopathy does not involve the direct application of natural products for weed management and other elements, such as resource competition, undoubtedly play a role in the overall management of weeds, this brief section highlights instances where particular allelochemicals were identified as the key molecules involved in weed control by crops [6].

## Conclusion

Bioactive natural substances that are employed as pesticides directly or indirectly have had a substantial impact on conventional pest control. In organic agriculture, biobased insecticides are frequently employed as substitutes for synthetic chemicals.

Good natural herbicides have been hard to come by, even though some of these insecticidal and fungicidal substances have effectively translated to the more traditional crop production methods. Glufosinate, a bialaphos metabolite, is the only natural herbicide suitable for large-scale cropping systems, yet organic farmers do not use it. However, glufosinate is non-selective and needs to be applied carefully if the desired crop is to be protected. This is also true of all commercially available natural herbicides (such as acetic acid, corn gluten meal, and essential oils).

A prospective multi-center Cohort study was conducted at two "tertiarty health care hospitals" Menofya university hospital and El sheikh Zayed Al Nahyan Hospital on a sample of 200 patient both gender with COVID-19 infection and MS disease selected according to inclusion and exclusion criteria,sample size was divided between 2 health care hospitals during the period from June 2020 to June 2022, it will start at the time of visit and for follow up till six-month clinical study after Covid-19 infection.All participants signed an informed consent after explaining them the objective of the study. Patients were enrolled in the study according to the following criteria: Patients from both genders have been included, above 18 and below 50, whom confirmed diagnosis of MS, whom confirmed Covid-19 diagnosis and who agreed to participate in the study after obtaining a written informed consent. While Patients younger than 18 and older than 50, those who have other chest comorbidities before covid-19 infection, aggressive relapsing remitting course of disease and MS variants (NMO, ADEM, transverse myelitis. etc) were excluded from the study. Demographic and clinical data were obtained from patients and medical records including date of onset and the nature of the first MS related presenting symptoms, date of diagnosis of MS, date of advice to start a (DMT), current DMT, total number of relapses during the course of disease, number of relapses annually, the EDSS scores were obtained from the patients records throughout their illness namely the EDSS scores before and after six month, the MRI scans of the patients were reviewed before and after six month from starting the current disease for the number of T2 lesions, T1 hypo intensity, and the CT chest of the patient during covid 19 infection.

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