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ABSTRACT

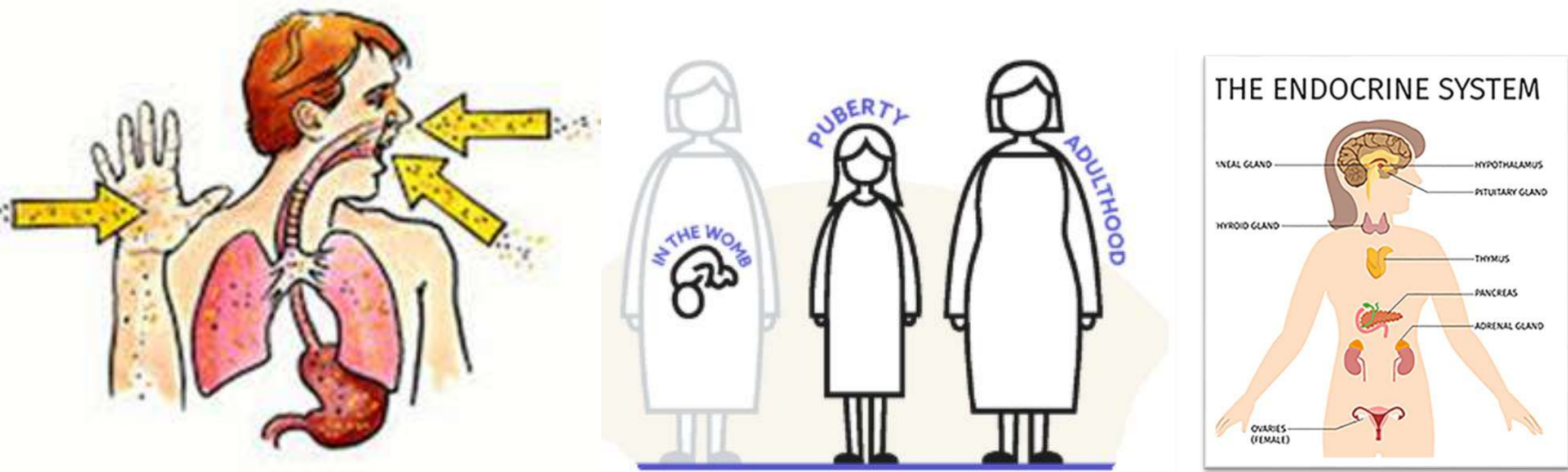
Pesticides, due to their high inherent toxicity and non-biodegradability, can cause adverse effects on human health and the environment. Many pesticides used can also induce pest resistance. Current studies show that some pesticides are potential endocrine disruptors with pseudo-hormonal activities and could interfere with people's reproductive process, mainly female agricultural workers particularly exposed due to intensive use of pesticide treatments and inadequate use of personal protective equipment. Sustainable agriculture favors these processes that do not alter the environmental balance and prevent occupational chemical risks. In recent years, there has been growing interest in the application of alternative agricultural methods, such as natural substances, recovery of ancient varieties, and supramolecular technology (S.M.T.) used as an alternative to synthetic pesticides and fertilizers.

INTRODUCTION

Directive 2009/128/EC establishes a "Community Framework for Action on the Sustainable Use of Pesticides" to reduce the impact and risks of pesticides on human health and the environment and promote the use of integrated alternative agricultural techniques. Pesticides are considered hazardous chemicals harmful to the environment and human health, particularly to user workers.



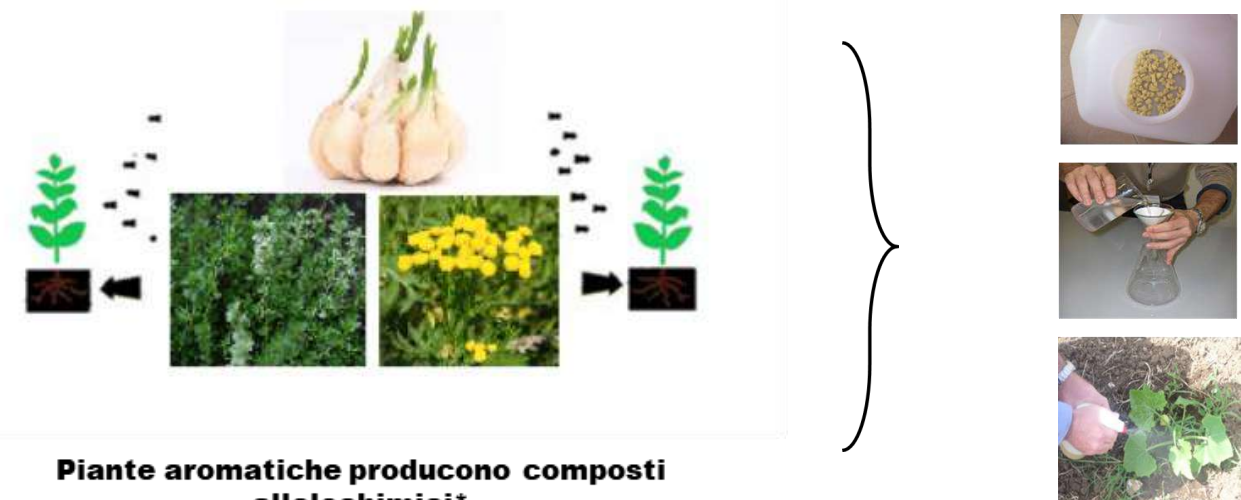
Pesticide use carries the likelihood of reporting serious acute or chronic adverse effects, the incidence of which is higher in women. Pesticides are considered endocrine disruptors (EDs) that affect hormonal, immune, metabolic, and reproductive functions by influencing the reproductive process (gamete production, fertilization, intrauterine and postnatal offspring development) with most frequent effects on neuroendocrine system organs (endocrine disruption), thyroid function, and the female reproductive system.



MATERIALS AND METHODS

1. Use of phytocomplexes extracted from medicinal plants

Aqueous extracts are complex mixtures of different chemical compounds (terpenes, alcohols, aldehydes, phenols) that exhibit potential herbicidal, insecticidal, and fungicidal properties and have greater activity than single active ingredients (synergy) leading to a more effective response [Hummelbruner et al., 2001; Singh et al., 2009; Chockalingam et al., 1990]. Experimental field trials were conducted on zucchini var. Augustus (Romanesco type) crops to test their efficacy as fungicides and insecticides.



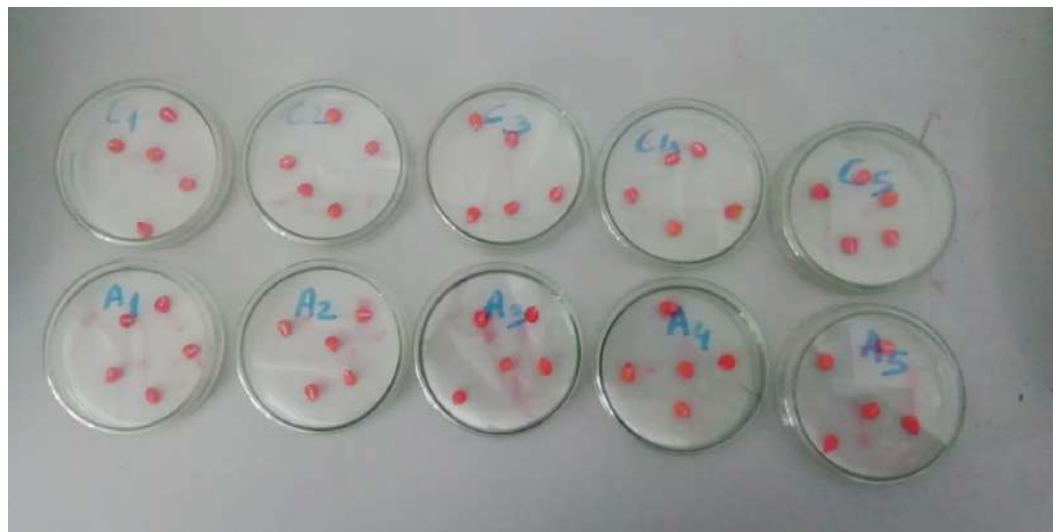
2. Ancient cultivars reintroduction

Solina is an ancient soft wheat cultivated in Abruzzo since the early 16th century. In Italy, the abundance of ancient varieties has allowed the recovery of several native wheat varieties that have recently been rediscovered and cultivated. These crops could increase both the biodiversity of agricultural ecosystems and food diversification because they are commonly grown organically, with sustainable, environmentally friendly, low-input plant protection products and fertilizers.



3. Supra Molecular Technology (S.M.T.).

Due to its structural and electromagnetic properties, SMT-treated water is currently studied as a biostimulant to improve the relationships in the plant-soil system. The various mechanisms associated with the action of this water relate both to plant physiology (nutrition and health self defense) and to the improvement of fertility levels and soil biodiversity. This seems to be a promising field of study to reduce the exposition risk in agriculture.



RESULTS AND DISCUSSIONS

1. The experimental use of the extracts has demonstrated favorable phytosanitary efficacy, evidenced by the absence of attacks by insects, fungi, and bacteria. Additionally, the extracts have exhibited promising antioxidant and biostimulant properties. Several studies have demonstrated that ancient varieties can be cultivated using environmentally sustainable organic farming practices, with minimal or no reliance on synthetic pesticides and fertilizers. This approach has been shown to result in agronomic yields that are comparable to those of modern varieties.
2. The utilization of these modes of production has the potential to enhance both biological diversity within agricultural ecosystems and the diversification of food sources. This is due to the fact that they are frequently cultivated organically, with a sustainable, environmentally friendly, and reduced input of pesticides and fertilizers.
3. In May 2024, a germination test on corn was conducted using Petri dishes, with a disk of bibulous paper placed at the bottom. The paper was soaked with both SMT-treated water and well water (control), with five replicates for each treatment. Five corn seeds were placed in each dish for germination. After five days from the test setup, the following were observed: germination percentage, primary root length (PRL), and any development of fungal attacks. The results of the germination tests demonstrated that the method in question proved to be an effective means of controlling mold growth on treated seeds, in comparison to the control.

CONCLUSION

The results obtained in this study indicate that alternative agricultural methods have the potential to replace pesticides, thereby reducing occupational exposure risks, eliminating the need for highly personal protective equipment (PPE), and allowing for the use of less effective and more readily tolerated ones. This has the dual benefit of improving the health and safety of workers, particularly female agricultural workers.



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