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Prospects of plant extracts in progressive agriculture: A Review

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Abstract

Since the dawn of time, Indian agriculture has been plagued by a variety of destructive problems such as weeds, fungi, and insect pests, all of which have resulted in a rapid decrease in yields. Weeds compete with crop plants, reducing crop yields by 5 to 50 percent. Insect pests are farmers' worst enemies because they eat crops, stored grains, and serve as a vector for livestock diseases. Various fungi ruin agricultural and horticultural crops, causing economic losses and posing a health risk to consumers due to mycotoxins created by the fungi. Chemicals are used to monitor many of these bio agents, but their widespread use has resulted in weed, fungus, and pest resistance, as well as higher costs, residual toxicity levels, resulting in fertile lands being infertile and poisonous. The best solution for this is to use indigenous traditional methods of control used by farmers, such as plants that were once common all over the world but have nearly disappeared in developed countries due to the introduction and use of modern synthetic chemicals, and are now restricted to only a few regions of developing countries. Plant extracts, according to various reports, contain a variety of bioactive components that can regulate many of these crop-destroying agents. The aim of this paper is to summarize the results of using plant extracts to monitor plant bio agents. Plant extracts are cheap, environmentally friendly, readily available, and are therefore recommended for sustainable agricultural production

Key words: Diseases, Pest, Weeds, Chemicals, Resistance, Plant extracts, Sustainable Agriculture.

Introduction

In agriculture, indiscriminate use and overdependence on chemicals has resulted in weed, fungus, and pest resistance, pest resurgence, which has resulted in minor agents achieving major status, the eradication of natural enemies, higher levels of residual toxicity in soil, and environmental contamination by contaminating air, soil, and water, all of which are detrimental to humans and wildlife. Weeds are a significant hindrance to the growth of many crops. Chemical weed control has gained popularity among farmers in recent years due to its ease of use and lower cost than conventional hand weeding. The large scale use of synthetic herbicides has led to the development of a number of environmental problems, including risks to human health and the induction of weed resistance (Jabran etal., 2010).

Almost every crop in the world is affected by different types of pests and diseases, and most of them are fungal pathogenic diseases. Also vulnerable to grains that lose yield of grain and dry matter, thereby lowering the quality of feed and the seed provided by significant fungal genera such as Aspergillus, Fusarium, Penicillium and Alternaria sp (Magan and Aldred, 2007). The main step in fungal control is the use of fungicides that are available after harvest and which do not affect production quality (Amiri et al., 2008). Antimicrobic chemicals have been used since decades to control of plant diseases, causing development of resistant pathogen populations due to increased concentrations in food products as some of these chemicals are not biodegradable and accumulate in soil, plants and water, affecting living organisms.

Insect pests are farmers' worst enemies because they eat crops, stored grains, and serve as a vector for livestock diseases. Chemical pesticides are used to manage these pests, but their widespread usage has resulted in insecticide tolerance in pests and higher levels of residual toxicity, resulting in the conversion of fertile lands into infertile and toxic environments. Just 0.1 percent of synthetic chemical pesticides reach the target pests, with the remaining 99.9% released into the environment, posing environmental and health risks. Synthetic chemical pesticide contamination of soil and water sources has a negative impact on macro and micro flora and fauna.

As a result, it is now important to look for alternative control methods that will reduce the use of synthetic chemicals. The growing concern about environmental protection and the global demand for chemical residue-free food has sparked interest in controlling chemical resistance in weeds, fungi, and insects using botanicals, biopesticides, and biocontrol agents. These agents are effective against chemical resistance in weeds, fungi, and insects, and have no negative effects on plant growth parameters.

Plants produce various secondary plant metabolites that are negligible for plant growth and development but function as antimicrobial pathogens due to their toxic nature (Rosenthal et al., 1991). (Schafer et al., 2009). Exploration of plant-based pesticides to control post-harvest losses is one of the feasible approaches, as it leads to the environmentally sustainable use of natural products and acts as a rich source of natural compounds with many fungicidal and other properties and few side effects. Over 2500 plant species from 235 families have been discovered to have the characteristics required for a perfect botanical insecticide. Various plant species have yielded approximately 350 insecticidal agents, over 800 insect feeding deterrents, and a large number of insect growth inhibitors and regulators. Botanicals are made from a number of plant parts, including leaves, stems, seeds, roots, bulbs, rhizomes, unripe fruits, and ower heads. As a result, a wide range of natural plant chemicals have been tested for agricultural use, keeping in mind that natural chemicals must be sensitive at very low doses, have optimal target pathogens and potential target sites, and be appropriate to the agrochemical industry, all of which can be achieved through proper dose response studies.

Since the early 1970s, agriculture has been grappling with the emergence of pathogen resistance to disease control agents as a result of prolonged use of chemical pesticides, prompting public demand for safer pesticides with lower environmental effects. As a result, analysing natural products and extracts as a new source of strategy for the discovery of new chemicals not previously produced by chemists is a good idea (Wedge and Smith, 2006).

In this case, a new investigated approach for plant disease control is an alternative to chemical fungicides for removing these synthetic compounds or, at the very least, regulating their use in conjunction with natural fungicide substances is a specific strategy plan known as Integrated Pest Management.

The underlying principle is biological control for soil and health enhancement. Chemicals have undoubtedly benefited farmers, but their continued use in agriculture has posed a major threat to the natural environment in the long run. Incorporation of more eco-friendly and sustainable crop management activities, among which botanical plant extracts, offers a new dimension through development of excellent source of biologically active natural products, with the rising consumerism of organic food and policy support for sustainable agriculture correcting the vices of the Green revolution. As a result, botanicals can usher in a new era of sustainability in agriculture and fostering safe agriculture. To promote, it needs more awareness programmes.

Plant extracts:

A solution is derived from the processing of plant components by means of a solvent which is further condensed by evaporation, distillation or any other method. Many naturally occurring phytochemicals are found in plant tissues, and many studies have tested their antimicrobial activities in plant extracts such as garlic (Allium sativum) against bacteria (Cavallito and Bailey, 1994), fungi (Adetumbi et al., 1986), and viruses (Adetumbi et al., 1986). (Weber et al., 1992). Ginger (Zingiber officinale) has been shown to have analgesic, sedative, cardiotonic, and antibacterial properties (Hibert, 2006), as well as the ability to kill E. coli and B. cereus bacteria (Wood, 1988). (Kim et al., 2005). Onion (Allium cepa) also show a B. subtilis, Salmonella sp., and E. coli (Winston, 2008) and molten aflatoxin antimicrobial effect (Sharma et al., 1979). Researchers are now paying more attention to developing alternative, environmentally friendly, non-toxic approaches for humans and animals that are quickly biodegradable in order to overcome the risks posed by the use of pesticides.

Plant extracts in crop protection:

Botanical products are plant materials or products known for their pesticidal, medicinal or therapeutic characteristics. Phytopesticide materials vary from whole fresh herbs to bioactive strictly isolate or effective formulations for pests and pathogens (Prakash and Rao, 1996). These natural pesticides are reusable and can be prepared in mini bags or as fresh dried product, liquid extracts, powders and cakes. In ancient China, Egypt, Greece and India, botanicals were already used two thousand years ago to combat agricultural pests (Isman 2006). Today, traditional botanical pest control is still widely spread between subsistence and the transitional farmers for the safety of farmers or during storage (Belmain and Stevenson 2001; Gerken et al. 2001). In some regions of Zimbabwe and Uganda, for example, up to 100 percent have used or used botanicals (Makaza and Mabhegedhe 2016; Nyirenda et al. 2011).

Methods of preparation of different indigenous botanicals by farmers

Neem (Azadirachta indica) leaf extract:

Materials required: Neem leaves (80kg/ha).

The fresh neem leaves were collected and soaked overnight in water. Next day, soaked leaves were taken out and ground and the extract obtained was filtered. The filtered extract was diluted @ 2.53 L in 50 L water and sprayed.

The limonoids in neem are thought to be responsible for its insecticidal properties. While azadirachtin A is thought to be the most active compound in neem insecticides, other limonoids may also play a role (Boursier et al. 2011; Isman et al. 1990). Lynn 2010; Nathan et al. 2005) and may even prevent the development of azadirachtin A resistance (Feng and Isman 1995).

Commercial neem extracts are commonly used to monitor a wide variety of insects and mites. Commercial neem-based products' insecticidal and acaricidal properties have been extensively demonstrated (Morgan 2004). Homemade aqueous extracts based on neem plant material (leaves, seeds, seed cake, and unformulated oil) have been successfully used to control blattodean pests (Ibrahim and Demisse 2013), hemipteran pests (Aziz et al. 2013; Degri et al. 2013; Gupta and Pathak 2009), lepidopteran pests (Abate 2011; Attia et al. 2011; (Tables 1 and 2). In seven of the eight trials against lepidopteran pests, neem aqueous extracts were found to be effective. In 15 of 18 cases, foliar or soil application of neem aqueous extracts for insect pest control outperformed negative controls, and yield was increased in all 9 trials where yield was measured. In ten out of fifteen cases, neem aqueous extracts were equivalent to synthetic pesticides, but in five cases, they were inferior. Patil and Nandihalli (2009) were the first to demonstrate the efficacy of neem aqueous extracts or an oil emulsion against mite pests in field applications; both preparations decreased mite population but had no effect on yield.

In storage application trials, ground neem plant material successfully and reliably monitored coleopteran pests (Ahmad et al. 2015; Boeke et al. 2004b; Ileke and Oni 2011; Ilesanmi and Gungula 2010; Kemabonta and Falodu 2013; Kossou 1989). Only 1 out of 8 times did it fail to provide any power, which could be explained by the low quantity of neem leaves used.

In Nigeria's north central region, the Neem plant (Azadirachta indica A. Juss Fam. Meliaceae) has a wide range of uses in the management of crop and household pests, as well as for medicinal purposes and as shade trees. Its use in the area's folklore and tradition to protect crops and homes from pests and pathogens is recorded (Ezekiel et al 2008). Terpenoids, nimbin, azadirone, and azadirachtin are found in Azadirachta indica (neem tree), and these compounds have antimicrobial properties. Azadirachtin can be derived from both the fruits and the leaves of this plant. It's also an insect repellent that can stop insects from reproducing. At higher concentrations, Azadirachta indica significantly inhibited conidia production and growth, according to Obongoya et al. (2010). (length of haustoria is 1-2 mm). Fusarium inhibition was also observed at lower concentrations. When compared to the other three crude plant extract formulations, the Azadirachta indica formulation resulted in a substantial reduction in wilt incidence.

The spray application of Neem inhibits mycelial growth in the vascular system by being systemically translocated into the plant (Gupta et al., 1999; Vyas et al., 1999). Neem can be used to monitor Fusarium yellows disease on farms, according to studies. At both low and high concentrations, it significantly inhibits conidia production and growth. Azadirachta indica is a natural botanical pesticide with low toxicity to humans and animals; it can be an effective plant control agent in subsistence farmers' integrated pest management (IPM) programmes. According to Suleiman and Emua (2009), aqueous extracts of Azadirachta indica tested in vitro showed varying levels of toxicity to the fungus (P. aphanidermatum), which causes root rot in cowpeas (Vigna unguiculata). The fungicide bavistin (carbendazim) was found to be as effective as aqueous extract of neem (Azadirachta indica Juss.) leaves in controlling the leaf stripe pathogen (Drechslera graminea) on barley (Paul and Sharma 2007).

Garlic (Allium sativum) extract:

Materials required: Garlic bulbs (30gm).

30g of garlic bulbs were ground thoroughly in grinder with 50ml water. Ground mixture was soaked in little quantity of water over night and squeezed through muslin cloth and the volume was made up to 1Lby adding water and sprayed.

The pesticidal activity of garlic cloves has been attributed to sulphur-containing compounds that arise from the enzymatic degradation of allicin (Huang et al. 2000; Prowse et al. 2006; Yang et al. 2012; Zhao et al. 2013). Garlic extracts have been shown in laboratory trials to have acaricidal properties (Dąbrowski and Seredyńska 2007; Roobakkumar et al. 2010) and insecticidal properties against coleopteran, dipteran, lepidopteran, and hemipteran pests (Abdalla et al. 2017; Denloye 2010; Prowse et al. 2006; Yang et al. 2012; Zhao et al. 2013). In field application trials, garlic aqueous extracts resulted in a varying level of control of hemipteran pests (Bahar et al. 2007; Baidoo and Mochiah 2016; Fening et al. 2013; Oparaeke et al. 2007; Said et al. 2015), lepidopteran pests (Baidoo and Mochiah 2016; Fening 2013; Oparaeke et al. 2007) as well as mites (Attia et al. 2011). Other studies suggest that garlic-based homemade pesticides may be used to control mites on tomato (Kaputa et al. 2015) and fruit flies on watermelon (Degri and Sharah 2014), but the authors did not perform relevant statistical tests.

Allium sativum (garlic) contains a significant antibiotic compound called allicin. It is effective against a broad range of bacterial species at dilutions of 1:10. Mmst bacteria hve been shown to be susceptible to allicin. Fresh garlic extracts have also been found to be effective against many fungal species and have been used to protect plants and stored foods (Stoll, 1998). Jacob and Siva Prakasan (1994) and Arya et al. (1995) studied the antifungal activity of the extracts of various plant species against Fusarium pallidoroseum and reported inhibitory effect of extracts of garlic bulbs and Bignonia leaves on the mycelial growth of Fusarium pallidoroseum. The extract of A. sativum at highest concentration was found to be most effective in reducing the spore germination of Fusarium pallidoroseum. In addition, A. sativum was known to act as anti-fungal activity (Sahayaraj et al., 2006). Similar results were found by Misra and Dixit (1976) and Bowers and Locke (2000) using Allium sativum against eighteen different fungi including Fusarium spp (Taskeen-Un-Nisa, et al 2011).

Garlic–Chilli (Capsicum annum) extract:

Materials required: Green Chilli 30g, and Garlic 30g.

Garlic bulbs and green chilli (30g each) were ground separately in a grinder with little water. Grinded material was soaked in water overnight separately and the extract was squeezed using muslin cloth, both were mixed and the volume was made up to 1L to obtain 3 percent concentration.

The key compound that gives chilli peppers their spiciness is capsaicin. Commercial insecticide formulations containing capsaicin are readily available. Capsaicin, for example, has insect repellent and insecticidal effects against hemipterans (Bergmann and Raupp 2014; Dayan et al. 2009). Other compounds, according to Antonious et al. (2006, 2007), can contribute to the insecticidal activity of chilli pepper preparations. Chili pepper aqueous extracts have been used to combat hemipteran pests (Amoabeng et al. 2013; Baidoo and Mochiah 2016; Fening et al. 2013, 2014; Okrikata et al. 2016), lepidopteran pests (Amoabeng et al. 2013; Baidoo and Mochiah 2016; Fening et al. 2013, 2014; Okrikata In five out of ten cases, chilli pepper aqueous extracts outperformed negative controls. However, the synthetic pesticides used as a positive control in four of the five trials where chilli pepper aqueous extracts were ineffective were also ineffective (Fening et al. 2013, 2014); therefore, those trials are not definitive.

In storage tests, ground chilli pepper fruit in 2 studies (Onu and Aliyu 1995; Yusuf et al. 2011) dominated the cowpea weevil Callosobruchus Maculatus but failed in a third study (Boeke et al. 2004b). However, farmer participatory trials in Ghana over 5 years affirm the effectiveness of this practise (Belmain and Stevenson 2001). Moreover, a study by Belmain et al. (1999) found that chile pepper was effective in killing and repelling different species of weevils which attack stored grains but did not contain precise figures from this publication.

Ginger (Zingiber officinale Roscoe)

Zingiber officinale (ginger) contains gingerols and polyphenol compounds (antioxidants) which have many medicinal properties. The rhizome is effective against many diseases that affect cultivated pest Crops (Stoilova et al., 2007). Also, plant species like Piper, Xylopia, Gongronema, Latifolium, Citrus, Bryophyllum, Pinnatum, Vernonia amygdalina, Chrysanthemum and Ocimum have been reported to be promising species as crop protection (Jacobson, 1989; Stoll, 1998, 2000; Okonkwo, 2001; Opara and Wokocha, 2008).

Opara and Obani investigated the effectiveness of certain plant extracts and pesticides in the management of bacterial spot diseases in solanum (2010). The outcome of the analysis showed that Z. officinale controlled the severity of the condition most effectively in comparison with three additional extracts and was better than control (sterile water). The bactericidal impact of plant extracts on Solanum's leaf spot disease is in line with Stoll's (1998) and Amelio's (1999) documents, which show that it contains substantial antibiotic substances and some medicinal properties. The effectiveness of these plant extracts could also be attributed to the bioactivity of the constituents of the plant materials (Bankole, 1997)

Indigenous botanical sprays used by the farmers to control insect pests in crops.

Botanical	**Target pests**
Neem leaf extract	Defoliators and Sucking pests
Garlic extract	Spodoptera litura (leaf eating caterpillar), Helicoverpa armigera (fruit borer), and other lepidopteran pests
Garlic-Chilli-extract	Helicoverpa armigera (fruit borer), Spodoptera litura (leaf eating caterpillar), Leucinodes arbonalis (Brinjal fruit & shoot borer), Amsacta albistriga (red headed hairy caterpillar)
Fermented botanical spray	Leucinodes orbonalis (Brinjal fruit and shoot borer), Pod borers of pulses, Tobacco caterpillar (Spodoptera litura)
Adathoda vesica leaf extract	Defoliators and Sucking pests
Datura plant extract	Tea mosquito bug, Thrips, Jassids, Aphids
Ekka leaf extract	Termites
Lantana leaf powder	Aphids
Lantana leaf extract	Beetles, Leaf miners, Defoliators
Mixed leaves extract	Defoliators like Spodoptera litura, semi loopers
Panchapatre	Defoliators, Fruit borers, Sucking pests like Aphids and Whiteies
Nilgiri leaf extract	Jassids, Aphids, Scales
Chilli Neem Garlic exract	Lepidopteran pests in Pigeon pea
Multiple plants leaf extract	Multiple plants leaf extract

Allelochemical activities of some natural plants (Botanicals)

Name of plant	Allelochemical	Action
Bambusa vulgaris (Bamboo)	Rutin, Tricin, Luteoalin	Controlled small grassy weeds; Pesticide effects
Calotropis gigantean (Akanda)	Calotropin and Mudarine	Controlled most small grassy weeds; Pesticide effects
Carica papaya (Papaya)	Benzyl isothiocyanate	Herbicide effetcs
Echinochloa colona (Jangli dhan)	Cumaric acid, Apegenin,Benzoxazinoids	Potential used for monocot grassy weed control
Lantana camera (Lantana)	Lantradene-A	Weed control; Pesticides effect
Oryza sativa (Paddy wild cultivars)	Momilactone B	Control grassy weeds like Echinochloa spp.
Parthenium hysterophorus (Congress grass)	Sesquiterpene lactones & Phenols	Control small grassy weeds
Pinus sylvestris (Pine)	Terpene hydrocarbons, Ethers and esters	Non-selective herbicide, not so much effective as glyphosate
Sorghum halepense (Jhonson grass)	High prussic acid; Sorgoleone	Supress the weed growth
Syzygium aromaticum (Clove)	Eugenol, caryophyllene and acetyl eugenol	Controlled most small grassy weeds; pesticide effects
Tectona grandis (Teak)	Phenols, salicylic acid	Controlled small grassy weeds; pesticide effects

Natural Products as Herbicides.

Weeds become immune to herbicides including glyphosate and natural products are a suitable substitute (K. Jabran et al., 2015). The main sources of secondary metabolites that have various applications in agriculture are plants and microorganisms. Allélopathic plants that release chemical substances which affect the growth, nutrient absorption and reproduction of other species. Studies have shown that weed control is based on plants with high allelopathic activity. Rough extracts have been used in recent times successfully in order to prevent weed germination and growth from various plant sections (R. A. El-Mergawi etal., 2019). The extract of Melaleuca cajuputi is active ingredients like caryophyllene, eugenine, humulene and its medicinal properties (B. W. B Kueh et al., 2019.) Mikania micrantha root extracts included four new thymol products with allegopathic characteristics (Q. Xu, H. Xie, H. Xiao et al., 2013). Nine active compounds from the five Amaranthus species leaf extracts have been discoveredThis included coumarin and saponins for the allelopathic effects observed against lettuce (M. S. S. Carvalho, L. F. Andrade-Vieira et al., 2019). The phytototoximic effects on dicotyledone and monoocotyledons, such as Amaranthus caudaus L., and Echinochloa crusgalli L. have been shown to Bioachanine A, essential isoflavone. It is worth mentioning that the biochanin A degradation agent is phytotoxic to the same animal (M. T. I. Shajib, H. A. Pedersen, A. G. Mortensen et al., 2012). Similarly, the raw and aerial parts of Ruta graveolens and taproots of Horta oreadica are extracted from two pure chalepins (chalepin and chalepensin), and the growth of Allium cepa, Lepidium sativum and Lycopersicon esculentum was effectively blocked, and thus had a greater impact than synthetic herbicides (L. Nebo, R. M. Varela, J. M. G. Molinillo et al., 2014). A watery extract was also used to prevent Cyperus rotundus L from growing (G. al-Samarai, W. Mahdi, B. al-Hilali et al., 2018). L., Nerium Oleander L., Olée europäea L., Ricinus communis L. and synthetic herbicides (tebenuron) were also used. It should be noted that the highest inhibitory activity in N. oleander extracts was in comparison with the other two extracts and the synthetic herbicide.

Natural Products as Fungicides.

A number of plant extracts were used as fungicides successfully. Examples of leafs include the extracted Azadirachta indica (A. Akpuaka, M. M. Ekwenchi, etal., 2013), the Curcuma longa leaves (H. Masih, J. K. Peter and P. Tripathi etal., 2014) and the peels of Ipomoea batatas Lam (A. P. Oluyori, A. K. Shaw et al., 2016). Papayas and thyme and lemongrass extract (M. Camara, E. Faie, S. Modou Sarr et al. 2017) (R. Persaud, A. Khan, W.-A. Isaac, W. Ganpat, and D. Saravanakumar et al., 2019). Azadirachta indica leaf extract can be due to the inclusion of crude extracts of compounds such as dibutyl phthalate, phytol, nonanoic acid, tritriacontane and 1,2-benzedicarboxylic acid (A. Akpuaka, M. M. Ekwenchi et al., 2013). In the peels of Ipomoea batatas Lam. with a fair growth activity Sporothrijschencki and Trichophyton metagrophytes fungi have been reported as having three compounds naming stigmasterol, three-friedelanol and urs-13(18)-ene-3β-yl acetate (A. P. Oluyori, A. K. Shaw, R. Preeti et al., 2016). Thyme and lemongrass extract successfully reduced sheath blight disease in rice by attacking R. solani, thereby enhancing crop growth and yield of grains (R. Persaud, A. Khan et al., 2019). The essential oils, saponins, tannins, flavonoids and other phenolic compounds in these extracts are the products of these operations (I. Owis etal., 2015). Extras from Curcuma longa leaves have also been shown to have remarkable minimum inhibitory levels of Aspergillus fumigatus 6.25 μg/ml and Helminthosporum spp 12.5 μg/ml (H. Masih, J. K. Peter, and P. Tripathi., 2014). In addition to the condition known as the pink root disease (fungus-initiated Pyrenochaeta terrestris (Hansen), For onions in the nursery, this is a challenge. In inhibition of this fungal disease extracts from A. indica and C. papaya leaves were nevertheless well contrasted with synthetic fungicides. A. indicica and C. papaya leaves can also be employed in antipathy as an inexpensive, ready-to-use and environmentally friendly substitute (M. Camara, E. Faye et al., 2017).

Natural Products as Insecticides.

Selected botanicals were researched successfully in pursuit of healthy, cheap and sustainable ways to combat infestation by insects. Crude extracts from various plant sections have shown to have significant insecticidal properties. Carica papaya seed extract (K. Konno, C. Hirayama, M. Nakamura et al., 2004), polar and nonpolar extracts of Persea americana Mill seeds, peels, and pulp (R. C. Torres, A. G. Garbo et al., 2014), Clausena lenisJ. stem and leaf extract (G. Scott, N. Liu, and Z. Wen 1998), and Cal (R. Larayetan, Z. S. Ololade et al., 2019), Azadiirachta indica seeds, Phytolacca dodecandra seeds and Schinnus molle seeds (L. P. Ribyro, O. Z. Zanardietals, 2014), basic citrus oil (F. Tacoli,V.A. Bellet al., 2018), (B. Sisay, T. Tefera et al., 2019). In any of such insecticidal extracts, the active components are not concealed. In these extracts, phytochemicals are specifically responsible for the events detected, and their action mechanisms have been studied. Tree has many ingredients that can be obtained from its extracts of leaf, bark and seed (M. A. Hossain, W. A. S. Al-toubi, et al., 2013). Azadirachtin is a big part of neem seeds in particular. The insecticidal property of azadirachtin interferes with feeding, development, synthesis and delivery of moulting hormones (ecdysteroids), causing adult female insects to sterilise and inadequate moulting in young insects (M. B. Isman et al., 2006). The product has also been considered to be mild against vertebrates, boring agents, caterpillars, whiteflies, mealy bugs and weevils and beneficial insects, such as ladybugs, bees and spiders (A. Onekutu et al., 2015). A wide variety of activities in azadirachtin resulted in the different brand of organic insecticides that originated from the neem tree (Agroneem, Azatrol EC, and Ecozin) (M. B. Isman et al., 2006). Likewise, ethanol extracts of A. mucosa seeds are due to acetogenins that are active against arthropod, their insecticidal operation. Acetogenins function by inhibiting the cellular plasma membrane enzymes and the mitochondrial arthropods transport systems L (P. Ribeiro, O. Z. Zanardi et al., 2014).

Conclusion

Alternative management techniques are used because of identifiable issues related to chemical contaminants, biodegradation, phytotoxicity and contamination related to chemical control strategies. Plant extracts for the treatment of plant diseases are less expensive, more assessable, more readily available, more specific, environmentally friendly, and human-safe than synthetic compounds. Farmers should be encouraged to use plant extracts for long-term agricultural and horticultural production. Botanicals are beneficial because they are biodegradable, they have high structural diversity and complexity, and they are diverse and safer for non-target species. However, it is desperately necessary to make good use of botanical products on the rural market in order to take full advantage of the potential of eco-friendly botanical extracts, along with an advanced way of thinking through knowledge and training programmes.

References:

1. Abo-El- Seoud, M.A., Sarhan, M.M., Omar, A.E. and Helal, M.M. 2005. Bioside formulation of essential oils having antimicrobial activity. *Archiv. Phytopathol. Plant Protection* 38: 175-184.

2. Akila R, Rajendran L, Harish S, Saveetha K, Raguchander T and Samiyappan R. (2011): Combined application of botanical formulations and biocontrol agents for the management of Fusariumoxysporum f. sp. cubense (Foc) causing Fusarium wilt in banana. *Biological Control.* 57: 175–183.

3. Bhardwaj S.K. (2012): Evaluation of Plant Extracts as Antifungal Agents against Fusariumsolani (Mart.) Sacc. *World Journal of Agricultural Sciences*. 8(4): 385-388.

4. Bowers J.H and Locke J.C. (2000): Effect of botanical extracts in combination with biocontrol organisms on control of Fusarium wilt of muskmelon. *Phytopathology*. 90: S8.

5. Cabral L. C., Pinto V. F., Patriarca A. Application of plant derived compounds to control fungal spoilage and mycotoxin production in foods. *International Journal of Food Microbiology* 166(2013), 1-14.

6. Dayan, F.E., Charles, E., Cantrell, L. and Duke, O.S. (2009). Natural products in crop protection. *Bioorganic& Medicinal Chemistry*. 17:4022-4034.

7. Debjani C, Yumlembam R.A, Susamoy K, Ranjan N, Ramen K. K and Jayanta S.(2017) Effect of plant extracts against sheath blight of rice caused by Rhizoctonia solani; *Journal of Pharmacognosy and Phytochemistry*.6(4): 399-404.

8. DWR (2015). Vision 2050. Directorate of Weed Research, Indian Council of Agricultural Research. New Delhi. P.1-2.

9. Ghosh, R.K., Kumar, A., Ghosh, A., Mondal and P. Sounda, G. (2016). Bash of Botanical herbicides in annual planning of Weed Pest Management for Eco- Efficient Sustainable Agriculture. *Journal of Crop and Weed*. 12(3): 68-174.

10. Ghosh, R.K., Shamurailatpam, D., Ghosh and Kole, R.K. (2015). Use of botanical herbicides in system intensification. *Indian Journal of Weed Science* 47(4): 401-407.

11. Hassan, I., Nasir M.A. and Haque, M.R. (1992). Effect of different plant extract on brown rust and yield of wheat. *J. Agric. Res*., 30:127-31.

12. Hassane, N.M., AbouZeid, M.A., Youssef, I.F., and Mahmoud, D.A. (2008). Efficacy of leaf extracts of neem (Azadirachtaindica) and chinaberry (Meliaazedarach) against early blight and wilt diseases of tomato. *Austr. J. Basic Applied Sci*., 2:763-772.

13. Jana, P.K., Ghosh, R.K. and Kole, R.K. (2011). Efficiency of botanicals plant extract on weed pest management in System of Rice Intensification. In Proceeding: 3rd International Biopesticide Conference at Tamil Nadu Agricultural University (TNAU), Coimbatore; November, 28-30.

14. M. B. Isman, “Botanical insecticides, deterrents, and repellents in modern agriculture and an increasingly regulated World,” *Annual Review of Entomology*, vol. 51, no. 1, pp. 45–66, 2006.

15. Misra HP. 2014. Role of botanicals, biopesticides and bioagents in integrated pest management.*Odisha review.pp*.6267.

16. Singh RN and Sharatchandra B. 2005. The development of botanical products with special reference to seriecosystem. *Caspian Journal of Environmental Sciences* 3(1): 18.

17. Subbalakshmi Lokanadhan, Muthukrishnan P, and Jeyaraman S. 2012. Neem products and their agricultural applications. *Journal of Biopesticides* 5(Supplementary): 7276.

18. Vijayalakshmi K, Radha KS, and Vandana Shiva. 1995. Neem: A User's Manual. Centre for Indian Knowledge Systems, Chennai.96 pp.

19. Vijayalakshmi K, Subhashini B, and Shivani Koul. 1996. Plants in Pest Control: Garlic and Onion. Centre for Indian Knowledge Systems,Chennai. 38 pp.