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Integrated Pest Management of Potato (*Solanum tuberosum L*)

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Abstract

Potato is one of the major crops of the world like rice, wheat, and maize. It has inherent qualities that give it a competitive edge over the leading food crops like the production of more protein and carbohydrates, vitamins, and minerals. Having many dew

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organophosphorus insecticides ethoprophos and fosthiazate. However, organophosphorous insecticides are e ective at controlling wireworms they do not prevent all damage to potato tubers by this pest.

Some insecticides from di erent chemical groups, including pyrethroids and neonicotinoids, have activity against wireworms. ese are available as seed treatments. For sugar beet, cereals, and oilseed rape in the UK. e use of these products on the appropriate crops in the rotation will help reduce the wireworm population size.

Potato tuber moth (Phthorimaea operculella)

Description

Potato tuber moth (PTM) has four stages: egg, larva, pupa, and adult. Adults have a narrow, silver-gray body with grayish-brown wings patterned with small dark spots (pictured). e body length is around a third of an inch and the wing span of an inch (2.54 cm). It is mostly nocturnal and attracted to light. ey are poor iers. Eggs are oval, smooth, and yellow, laid alone or in clusters on leaves or near eyes

Hosts

Bacterial wilt attacks more than 200 species. ese include economically important hosts such as tobacco, potato, tomato, eggplant, pepper, banana, peanut, and beans. orn apple and nightshade are two common weed hosts that are attacked by the disease.

Management Tactics

Cultural control

Phytosanitation and cultural practices are the most widely used practices for controlling bacterial wilt in the eld (Champoiseau et al., 2010). ese practices can be e ective in regions where bacterial wilt is endemic, or in locations where it is present but not yet established [16].

Biological Control

Among biological control agents, several soil bacteria and plant growth-promoting rhizobacteria (PGPR) are currently being investigated for their role in the control of R3bv2A (Champoiseau et al., 2010).

Henok et al., (2007) evaluate Ethiopian isolates of Pseudomonas uorescens as biocontrol agents against potato bacterial wilt caused by Ralstonia (Pseudomonas) solanacearum. According to Henok et al., (2007) three isolates of Pseudomonas uorescens i.e., PfS2, PfWt3, and PfW1 showed inhibition against the growth of the pathogen [17].

Lemessa (2006) working on biochemical, pathological and genetic characterization of strains of Ralstonia solanacearum (Smith) from Ethiopia and biocontrol with bacterial antagonists found that the most e ective strains (Pseudomonas uorescent APF1 and Bacillus subtlis B2G) consistently reduced wilt diseases and increased plant weight signi cantly [18].

Chemical Control

e most commonly used chemical treatment has been fumigation of contaminated soil/portions of the farm with methyl bromide (Champoiseau et al., 2010). is is a very expensive and tedious exercise and cannot be used in large areas. In addition, methyl bromide has been banned in most parts of the world and is being phased out. e other product commonly used at the eld level is sodium hypochlorite; it is appropriate for spot treatment of the holes le behind a er rogueing of the wilting plants, and for general eld sanitation but the use of sodium hypochlorite is expensive and tedious (Kaguongo et al., 2008) [19].

Late Blight of potato (Phytophthora infestans)

Description

Late blight is a plant disease that mainly attacks potatoes. Late blight was a factor in the Irish potato famine in the 1850s, during which millions of people in Ireland starved or were forced to emigrate. Entire potato crops rotted in the eld or storage because of late blight infection. Late blight is caused by an oomycete pathogen that survives from one season to the next in infected potato tubers [20]. is organism is well known for its ability to produce millions of spores from infected plants under the wet weather conditions that favor the disease (www.late blight). Early in the season, the disease can be introduced into a eld or garden on infected seed potatoes, from volunteer plants growing from diseased potatoes that were not harvested last season, from infected potatoes in cull piles (rejected potatoes), compost piles, or infected tomato transplants brought into the area. Spores produced on infected potatoes and tomatoes can travel through the air, land on infected plants, and if the weather is su ciently wet, cause new infections. Spores can also be washed through the soil to infect potato tubers, which may rot before harvest, or later in storage [21].

Biology

e life cycle can be completed on potato foliage in about ve days under ideal conditions. Sporangia develop on the leaves, spreading through the crop when temperatures are above 10 ℃ (50 ℉) and humidity is over 75%-80% for 2 days or more (Nowicki, 2013). Rain can wash spores into the soil where they infect young tubers, and the spores can also travel long distances in the wind. e early stages of blight are easily missed. Symptoms include the appearance of dark blotches on leaf tips and plant stems. White mold will appear under the leaves in humid conditions and the whole plant may quickly collapse. Infected tubers develop grey or dark patches that are reddish brown beneath the skin, and quickly decay to a foul-smelling mush caused by the infestation of secondary so bacterial rots [22].

Damage

Late blight of potato causes black/brown lesions on leaves and stems in humid conditions 0es on 1]TJ /T1_1 v cbato caus5to s7ms include t

nysipm.cornell.edu) [26].

Chemical control

e disease is primarily controlled by the use of resistant cultivars and fungicide sprays (Namanda et al. 2004). However, concerns about the environment, public health, and fungicide resistance have stimulated e orts to reduce the amount of fungicide used in late blight management. In Ethiopia, farmers frequently apply fungicides to control late blight but the economic bene ts accruing from the fungicide spray have not been established (Bekele and Hailu, 2001). Binyam et al. (2014a) also reported that reduced rates of Ridomil application resulted in better management of potato late blight with the highest marginal rate of return [27].

Conclusion

Potato is one of the major crops of the world like rice, wheat, and maize. It has inherent qualities that give it a competitive edge over the leading food crops like the production of more protein and carbohydrates, vitamins, and minerals. Having many desirable characteristics, however, it is severely a ected by numerous insect pests and diseases. In the future, it is advisable to expand the application of di erent integrated pest management tactics since it focus on the long-term prevention of insect pests and diseases by managing the ecosystem and being environmentally friendly.

Con ict of interest: the author declares there is no con ict of interest in the work.

Ethical statement: the author declares the work is his original work and this work has not been previously published elsewhere.

Data availability: data openly available in a public in open access.

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