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Control on Plant Virus Disease

Hussein Adinoyi[1]

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Abstract:

Throughout the world, plant viruses and its diseases are one of the important limitations for food production. From 100 years ago, studies about the plant viruses and virus diseases given much attention to their control. According to IXth International Committee on Taxonomy of Viruses (ICTV) classification of 2012, "there are 91 genera 1005 virus and viroid species infecting plants which are classified largely based on differences in host reaction, serology, genome sequence identity and phylogenic analysis of the virus". Controlling of plant disease has been tough to attain due to the absence of any operative methods of aiding virus-infested plants. Meristem-tip culture, chemotherapy and thermotherapy can be fruitful but still it cannot be implemented at a large scale. Subsequently, the chief objective is either to avert or interrupt virus contamination or to improve its situations. Numerous methods have been used to accomplish these purposes, comprising phytosanitation (engaging crop hygiene, quarantine measures, eradication, and use of virus-free planting stuff), variations in harvesting styles, and usage of pesticides to regulate routes, slight stress fortification and the disposition of resilient or forbearing ranges. In this review paper, we will discuss about the controlling of plant viral diseases through some techniques such as Control measures, Host Plant Resistance, Chemical Method, Phytosanitation etc.

Keywords: *Plant Virus Disease, Phytosanitation, Cropping, Pesticides Chemotherapy, Thermotherapy, Meristem-tip*

Authors:

1. *National Root Crops Research Institute, Umuahia, NIGERIA*

Introduction

Plants are infested through natural means by various viruses throughout the world and the amount of viruses incessantly establish themselves. Complex plant structure offer the habitation for an extensive series of pathogens, out of which viruses are one of the most widely spread category. Plants affect various crop species comprising the one that possess huge significance in cultivation. Sometimes the impact of viruses aren't harmful but their crop development and harvest usually decreases and may lead to severe financial damages. It have long been recognized and concluded that the inducement studies of viruses hinders the growth of crops. Its main aim is to control the developed effective viruses that could probably be made use on a larger scale to escalate crop yield and make positive usage of the cultivate land, labor and other assets like underutilization.

This paper considers the limitation to implementation and the possibility for emerging and employing combined controlled methods.

Control Measures: Elimination of certain viruses from diseased plants without killing or removing but by the application of heat or by the use of chemicals or meristem-tip therapy. By using these method, it is considered to develop a virus-free plants of vegetative-propagated crops for supplementary circulation and relief to cultivators. Such therapy can't be used on huge scale and absence of any conceivable method of ailing diseased plants is an essential limitation of control mechanism. Subsequently, additional methods have been accepted. These are to:

- Stop plants from becoming infested by any possible pathogen.
- Or cause a delay to the contamination to such a final phase of crop development so that harvests are not extremely compromised.
- Diminish the effects of infection.

Phytosanitation: According to this term, various approaches are applied so that control can be accomplished by reducing the amount of foci of contamination through which additional dispersal of virus can happen. It contains five chief means for doing this, which is as follows:

- Quarantine procedures to evade hosting viruses and their routes to parts free of them.
- Health including the elimination of all enduring plants, remains and self-sown 'volunteer' seedlings of former crops.
- Elimination from inside and nearby the crops of any weed or wild plants are recognized to be substitute hosts.
- Usage of virus-free piles of seed or vegetative propagations for all the fresh plantings.
- Exclusion ('roguing') of contaminated plants from inside the plantings, specifically those found during the most primary susceptible phases of crop development.

Quarantine: Data accessible on the terrestrial dispersal of viruses and their organism is insufficient because of absence of services and skilled staffs to conduct assessments and virus identifications. Viruses and vectors are limited to definite areas which is apparent but in some areas, it shows absence.

It contains noticeable benefits in espousing quarantine and methods to sustain the present condition and to escape hosting virus and vectors regions where they are conventional and originate trouble. There are also specific complications in regulating the program through the land boundaries and by natural calamities, anxiety and civic disturbance, difficulties are associated with the disruptions. Quarantine controls are of restricted price that are suggested by these problems because pests and pathogens will ultimately become recognized in all zones where agro-ecological situations are appropriate.

For virus detection, importance sustaining and refining quarantine processes and requirement to progress new procedures to overcome presently inflexible complications.

Crop Sanitation: It creates the problem that is by development of 'self-sown' seedling 'volunteers' of crops like as cereals, rice and groundnut. This simplifies the endurance and perennation of viruses and their vectors, and can offer a 'green bridge' between succeeding developing periods.

It contain advantages that are gained by approving agriculture practices which decline the quantity of crop remains and obstruct endurance. According to Sudan Gezira Irrigation Scheme, it was respected at an initial phase in researches on cotton leafcurl disease. Exceptional tools were developed to ease the exclusion and demolition of the cotton stubs lasting after yield that would otherwise subsist and restore to become foci of contamination in succeeding plantings. In this Sanitation, measures are accepting to evade the leftover of inoculum in sugarcane, tobacco and other marketable crops and it contain the law to help the elimination of all crops remains before fresh planting starts.

Elimination of wild hosts or weed: A number of viruses have wild hosts or weed that perform as centers of contamination from which there is dispersion within or inside the crops. Remove the causes of virus infection or vector hosts by standard phytosanitary control measure that are not portion of crop so as to minimalize the early virus infection cause and amount of routes. For example, spots of the perennial grass weed is the symptoms of maize dwarf mosaic disease and Sorghum halepense that happen normally inside and around crop stands. It contain advantages that to be achieved are also obvious from familiarity with Cacao swollen shoot virus in the Western Region of Ghana, where many outbursts in cocoa are allied with under-storey forest tree Cola chlamydantha.

Virus-free Propagules: For all new plantings, use of virus-free propagules that is a rudimentary method to regulate which is advantageous for numerous causes:

- Virus-free material forms more voluntarily and is more prolific than infested.
- If virus-free material is approved there are no preliminary centers of contamination inside the crops from the onset, during the primary most susceptible phases of crop development. This interruptions curbs the era above which any succeeding blowout can happen.
- Plants not infested till a final phase of crop development are disturbed lesser harshly than those infested initially.
- Infested propagules are predominantly hazardous causes of inoculum for they incline to be dispersed erratically inside crops. This expedites virus blowout from infested to adjoining healthy flora, if this is by connection or by routes.

Much consideration has been specified in technically to advance nations by these reasons that producing the virus-free frameworks of tubers and seeds, graftings or other propagules of crops that are promulgated vegetatively. There are no chief problem for attaining frameworks that are permitted from infection by careful selection or by using some form of therapy. To maintain and designate the health status of stock by using the official inspection and certification procedures.

Roguing: Elimination of symptomatic plants, termed as roguing, is a phytosanitary governing portion that is extensively used to eliminate bases of virus contamination from inside the crops. Roguing is widely applicable and used to control infected illnesses of various crops in both tropical and temperature areas. This method is most operative in contradiction to viruses that does not extent rapidly in any significant quantity. It is popular with agriculturalists, who are occasionally willing to assign the time and exertion essential to examine crops with carefulness and requisite occurrence to recognize and eradicate infectious plants When indications are noticeable and when the symptomatic plants are detached initially, before routes have seen them in case of operative of roguing and when vector number are less and when a virus is being transferred insistently by insect vector in case of non-effective.

Host Plant Resistance: Crop species contain a feature that is some amount of genetic diversity and it is used by horticulturalists and agriculturalists to proliferate crop yield and eradicate the most destructive possessions of pest and pathogens. By choosing and espousing genotypes, it is attained that productivity adequately and evade or endure biotic and abiotic limits.

Host plant conflict is virus diseases which is cooperative to discriminate between ‘positive’ and ‘negative’ selection. *Negative selection* is recognized as being several diseased and they do not develop or yield adequately due to which predominantly susceptible crop genotypes are unwanted by farmers or researchers. *Positive selection* is recognized by to distinguish essentially resistant genotypes when heterogeneous populaces are uncovered to contamination. Positive assortment necessitates considerable scientific input and proficiency, while negative selection is experienced

within even the most primeval cropping systems. Both selection has been used extensively and deliberately or inadvertently host plant resistance that play a big contribution to control the virus diseases by declining occurrence.

There are widely used in horticulture and agriculture, and could make a better contribution to govern the diseases but for some restrictions:

- Effective resistance breeding programmes are developed by considerable research as these must also take explanation of other biotic and abiotic constrictions and necessities of farmers, consumers and processors. For a sufficiently long period, needed funds, staffs and assets are not constantly obtainable.
- There have been occurrences of resilient diversities being unconfined without suitable on-farm analysis to guarantee that the variabilities are appropriate for espousal and that they encounter the frequent severe necessities of agriculturalists and customers.
- In case of resistant diversities are advanced, they may not be obtainable because of the absence of an operative seed multiplication and circulation arrangement, and farmers are ignorant of profits that are achieved from espousal.
- The struggle may be connected with disagreeable qualities as resilient diversities may lack some of the anticipated characteristics of the vulnerable diversities being grown.
- The requirement to adopt resistant diversities is not essentially enthralling, particularly if the disease happens irregularly and fascinates less consideration than other influences lessening harvest.
- Opposition may be overawed due to the arrival or augmented incidence of virus pressures that harm formerly unaffected diversities. Moreover, variabilities that are resilient in some zones may be vulnerable in others. Thus, it may be tough to progress and abuse broad-based struggle that is also robust.

Chemical Control: To decline the extension of legume viruses vectored by insects that is the application of insecticides. It is commonly ineffectual because victory with it relies on aspects like as mode of action of pesticide and mechanism of communication of virus. Insecticides should always be used prudently as they become unproductive when paths develop resistance to them and overdo consequences in undesirable side effects with environmental and economic values, like as accumulation of toxic remains, loss of advantageous natural enemies of vectors, and unanticipated growth of other pests or pathogens. By using chemical control of vectors, success in decreasing virus that is better with obstinately than with non-obstinately communicated viruses.

Non-persistent Viruses: Most common kinds of insecticides are infected at governing non-persistently aphid-borne viruses. It is the fresher generation of synthetic pyrethroids because of their speedy knockdown and superior anti-feedant action. This newer generation viruses contain applications that did not govern the virus adequately well to offer reproducible harvest escalations.

Persistently Viruses: Achievement was attained with chemical control of luteoviruses, like as BLRV and linked viruses, in cool-season grain legumes. In growing season, management could ascertain valuable in regions where contamination with FBNYV is probable to happen because chemicals are used in low temperature (100-200g/ha) that is more suitable ecologically than many of the elder generation of systemic insecticides generally practiced as foliar sprays. However, because of the ecological effect, chemical control should still only be reflected when other control methodologies are inadequate to accomplish financial harvests in infested crops.

Review of Literature

Thresh (2003), enhanced technology would only be achieved by emerging more operative approaches of regulating pests or pathogens illnesses. Critical trial for academics and farmers to advance the operative and justifiable means to govern the plant viral disease and also not destructive effects on human well-being and ecology.

Jones (2006), concluded that trial to attaining acceptable harvest and eminence of harvest to virus epidemics in cultivated plant. A progressively refined and dissimilar variety of host resistance, cultural (phytosanitary and agronomic), chemical, biological and legislative control measures are becoming accessible to meet this challenge. There is a growing knowledge base and complexity

technology to control the plant virus diseases. In this review paper, control measure also need to be naturally and publically maintainable, robust, and reasonable and friendly with standard agriculture performs.

Bosch, Jeger and Giligan (2006), dictated that from the preceding crop as planting stuff, broadcast of virus across the use of infested carvings and spread through an herbivorous insect vector map onto vertical and horizontal illness spreading ways. The outcome of transmission mode on virulence which is dependent on contrivances accountable for the spread in amalgamation with the trade-offs functioning in system under contemplation.

Loebenstein and Katis (2014), to control the virus disease in legume crops is through Integrated Plant Disease Management (IDM) that is, by crop management or ecosystem management. In this review paper applying the chemical methods to controlled the virus-infected crop.

Islam (2017), stated that knowledge and perceptive criticize the farmer's literacy about the plant diseases, their symptoms recognition and proper management practices. The farmers are not confused with virus diseases but they are pile up to their loss through wrong usage of pesticides. The long lasting solution against these diseases can only be through incorporation of host plant resistance due to the lack of knowledge of farmers about virus diseases. More than hundreds of research institutes, laboratories and universities about the plant virus diseases are failed and in generating the virus resistance crop verities against most of the plant viruses. Only few success stories relating to virus resistance cultivars but 0.1% is un-justifying.

Conclusion

In this review paper, many approaches are applied due to which monitoring plant virus diseases and it also comprise petite suspect that a number of the diseases now causing severe damages and diseases could be regulated through the application of prevailing information in tropics regions. There are also probable to be significant assistances from new technologies and methods to regulate the viral diseases by biotechnologists. This information is utilized by researchers and extensionists in developing and stimulating suitable large scale control methods that are not operative but suitable for use by farmers. Avoiding the destructive effects on human health or atmosphere by using control measures and should supplement and be completely attuned with those being used against pests and pathogens. If these studies should be done on large scale and over a satisfactorily longer duration to offer a consistent suggestion is cost-effectiveness of the control measures. Enhanced means of virus control plays a significant role in improving production and utilized the experience attained already in established countries and introducing the new biotechnologies.

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