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Short Communication

Curly Top Virus: A Viral Disease that Affects Crops and Deforms the Plant Growth

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DESCRIPTION

Curly top is a virus that infects a variety of crops. Plants with this disease are smaller, have withered petals and leaves, and are twisted and pulled out of shape. Curtoviruses (genus *Curtovirus*), members of the virus family *Geminiviridae*, are frequently responsible for them. In the western United States, such as California, Utah, Washington, and Idaho, this disease is prevalent. Curly top has stunted growth and deformed leaves and berries. The leaves' petioles and blades curl, twist, and discolour [1,2].

Beet curly top virus causes curly top disease in beets and is spread by the beet leafhopper over dry and semi-arid environments (*Circulifer tenellus*). This virus is commonly referred to as the curly top virus. Curly top can also be caused in tomatoes, beans, cucumbers, and other crops. Because beet leafhoppers and other insects like to feed on these plants in the sun, this illness can be reduced if plants are put in the shade. Beet curly top virus, Pepper curly top virus, and Spinach curly top virus can all cause curled top illness in spinach. Beet severe curly top virus, Beet mild curly top virus, and *Horseradish* curly top virus are all curly top *curtoviruses*. Turnip curly top virus could be a *Curtovirus* species [3].

Curtoviruses have a single circular ssDNA component with a size of 2.9-3.0 kb that encodes six to seven proteins. The three ORFs encoded on the virion-sense strand are the coat protein (CP, ORF V1), which encapsidates the virion-sense ssDNA and is important in virus movement and insect vector transmission, a movement protein (MP, ORF V2), and V3, which modulates the relative levels of ssDNA and dsDNA. The replication-associated protein (Rep, ORF C1), which is required for viral DNA replication to begin, the C2 protein (ORF C2), which acts as a pathogenicity factor in some hosts, a replication enhancer protein (REn, ORF C3), and the C4 protein (ORF C4), which is an important symptom determinant implicated in cell-cycle control, are all encoded on the complementary-sense strand. Curtoviruses and begomoviruses diverged when a recombination event changed insect vector specificity, according to nucleotide sequence comparisons [4].

The native flora of the western United States did not support significant, economically harmful populations of the beet leafhopper prior to the introduction of industrialized agriculture. Changes in agriculture, such as sporadic, intermittent cultivation and overgrazing of rangeland, altered this dynamic in favour of the bug. Due to a combination of circumstances, previously stable plant populations vanished, and were replaced by numerous winter and summer annual weed species. Weed hosts that followed the initial plant species included mustards (*Brassica* spp.), Russian thistle (*Salsola tragus*), filaree (*Erodium* spp.), and *Plantago* spp. Epidemics became increasingly frequently and severe as these common weeds became the preferred leafhopper hosts [5].

The leafhopper vector migrates to breeding regions in the foothills away from cultivated fields in the fall when crops die, overwintering on diverse biennials and perennials. The germination and emergence of various annuals that serve as leafhopper reproduction sites are aided by winter rainfall. The leafhopper lays its eggs on these annual plant types. As the plants in breeding sites dry out in the spring, the leafhopper returns to agricultural grounds. The intensity of infection is determined by environmental factors such as the existence of weed hosts, pathogen prevalence and severity, and leafhopper reproductive capacity and migration.

CONCLUSION

Curly top virus infects around 300 species in 44 plant families, making it one of the most widespread viruses in dicot plants. Sugar beets (after which the disease was called) are the most common infected hosts, followed by tomatoes, peppers, beans, potatoes, spinach, cucurbits, cabbage, alfalfa, and many ornamentals. The virus appears to be limited to trees with broad leaves, as no single-leafed plants have been discovered as a virus host.

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REFERENCES

1. "Curly Top". U.S Federal Science. Retrieved 28 May 2020.
2. "Curly Top Virus-Texas Plant Disease Handbook". Retrieved 17 December 2018.
3. Goldberg NP. Curly Top Virus. Guide H-106. College of Agriculture, Consumer and Environmental Sciences. New Mexico State University.
4. Baliji S, Black MC, French R, Stenger DC, Sunter G. Spinach curly top virus: A newly described curtovirus species from southwest Texas with incongruent gene phylogenies. Phytopathology. 2004; 94(7):772-779.
5. Briddon R, Heydarnejad J, Khosrowfar F, Massumi H, Martin D, Varsani A. Turnip curly top virus, a highly divergent geminivirus infecting turnip in Iran. Virus Research. 2010; 152(1-2):169-75.