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Spread and impact of Hop Latent Viroid on cannabis growth and quality

Speaker: Dr. Zamir Punja, Professor, Plant Biotechnology, Simon Fraser University

Co-authors: Li Ni, Cameron Scott, Dieter Kahl, Ron Reade, Keri Wang, Liam Buirs

Abstract: Hop Latent Viroid (HpLVd) is a highly infectious RNA molecule that is widespread on cannabis. A survey of HpLVd occurrence in Canadian licenced production facilities showed presence in 9 provinces, in 24.6 % out of 13,200 samples tested by RT-PCR. The genomic sequences were 100% homologous to an HpLVd strain from hemp in Colorado, USA and hops in China. Infected cannabis mother plants display stunted growth, with smaller leaves, mosaic symptoms on some leaves; cuttings from affected plants show reduced rooting; plants in flower show stunted and reduced growth of inflorescences. Glandular trichomes on flowers were significantly stunted in size, with smaller gland heads and stalks, with 12-30% lower THC, depending on the genotype. HpLVd was successfully transmitted by inoculating cut stem surfaces with sap, was detected in the roots 10-14 days later, followed by movement into young leaves, then older leaves by 4 weeks. Plants in a 12:12 hr photoperiod showed more rapid spread of HpLVd into roots and leaves compared to constant 24 hr. Viroid concentrations were significantly higher in fresh and dried flower tissues compared to the rest of the plant. HpLVd was transmitted through roots and water in a hydroponic growing system. Molecular detection was most consistent from root samples, followed by younger leaves and then older leaves. Infected mother plants varied in viroid concentration, from low (latent) to high (active), and by leaf position. Rigorous testing, destroying infected plants, and preventing spread on cut stem surfaces and tools, as well as root contact, can reduce spread.