

behaved in this fashion onto the four indicator hosts; all samples tested induced CLND symptoms in corn and severe red leaf in Asgrow Bugoff sorghum. MDMV-B was confirmed by electron microscopy, which revealed filamentous particles in leaf-dip preparations, and by host range symptomatology (comparisons were made with MDMV-A and MDMV-B cultures supplied by D. T. Gordon, Wooster, OH). Thus, MDMV-B is common in Kansas and has a more significant role in CLND than previously thought (5).

Generally, CLND symptoms are characterized by yellowing and browning of leaves and early death of plants. Around mid-August, however, some corn plants had drying ears (early drying of husk tissues) on otherwise green, healthy-appearing plants. Extracts of husk, shank, silk, and cob pith tissues reacted strongly in MCMV double immunodiffusion tests and were highly infectious on indicator hosts for MDMV-B. These viruses also were detected (by bioassays) in immature kernel, root, and terminal leaf tissues of dry-eared plants.

Bioassays of green ears collected in other plantings showed only MDMV-B infections. Thus, double virus infections (MCMV and MDMV-B) were closely associated with early drying of husk tissues, suggesting a causal relationship. The symptoms appeared in the early milk stage; affected ears were fully developed but produced wrinkled, shriveled seeds.

Our results indicate that WSMV and different strains of MCMV and MDMV contributed heavily to the CLND outbreak in Kansas and Nebraska in 1978 (Fig. 1) (3). Except for a reported occurrence in Peru (1), MCMV is currently known only in counties along and near the Kansas-Nebraska border. In 1976, CLND caused moderate losses in Alma (5); in 1977, only trace amounts of CLND were observed in Norton and Republic counties even though MCMV was detected in several plants with mosaic symptoms (D. L. Bockelman, *unpublished*). Apparently, little double infection with WSMV and MDMV occurred in 1977. However, the severity and distribution of CLND observed in 1978, the persistence of MCMV in the same

field for three seasons (J. K. Uyemoto, *unpublished*), and the migratory habit of beetle vectors (4) suggest continued spread of MCMV, and hence of CLND, to new areas. Present control recommendations include rotating crops (eg, soybean, sorghum, wheat) and planting CLND-tolerant hybrids.

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