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THE INCIDENCE OF CURLY-TOP VIRUS
ON SUGARBEETS IN IRAN -- 1966 TO 1969^{1, 2}

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Summary

Curly-top virus, which was discovered in southwestern Iran in July 1966, is apparently spreading through the sugarbeet-growing areas in the western part of the country. The most important insect vector of the virus seems to be Circulifer opacipennis (Lethierry), a leafhopper closely related to C. tenellus (Baker), the only known vector of curly top in the United States. Sugarbeets from five lines of Iranian seed which were grown at Yakima, Washington and exposed to curly top and the beet leafhopper exhibited symptoms comparable to those observed in Iran when the virus was vectored by either C. opacipennis or C. tenellus.

Since my discovery of curly top on sugarbeets in Iran in 1966 (3), I have followed the spread of this virus with interest and concern. Therefore, in 1968, I examined 10 or 12 sugarbeet fields within a 6-mile radius of Shiraz in southwest Iran for incidence and spread of the virus. In the approximately 2 1/2 years between the time of my first discovery of the virus and this last examination, the incidence had greatly increased and ranged between 10 and 80%. The virulence of the symptoms also varied widely within individual fields from very mild to severe enough to render some of the infected plants valueless as producers. It was difficult to assess the crop loss due to curly top, however, because other viruses and other diseases were present. Certainly, curly top was taking a toll of the yield in the fields where it was prevalent.

¹At the time of this work and observations, the author was an employee of the Regional Pulse Improvement Project, with headquarters in Tehran, Iran, and New Delhi, India, operating under a Participating Agency Service Agreement between the Agency for International Development of the United States Department of State, Agricultural Research Service of the United States Department of Agriculture, and representative government agencies of Iran and India.

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In 1967, symptoms of curly top on sugarbeets were reported from the area of Arak in western Iran, about 340 miles northwest of Shiraz. In June of 1969, a report reached me that a single sugarbeet plant with symptoms of curly top had been in an experimental planting near Varamin, Iran, about 24 miles southeast of Tehran. When I was in Tehran early in July 1969, I visited this experimental planting. It was about 2 or 3 acres in extent and had been planted by and was being grown under the supervision of the Foreign Agricultural Organization of the United Nations (FAO). In one corner, and scattered along one side of this planting, I found about a dozen sugarbeet plants with definite and clearcut symptoms of curly top -- the first I had ever seen in the vicinity of Tehran, although I had examined numerous fields at every opportunity since July 1966. This appearance of curly-top virus on sugarbeets near Arak in 1967 (about two-thirds the distance from Shiraz to Tehran) and near Tehran in 1969 is a strong indication that the virus is spreading northward through the sugarbeet-growing areas in the western part of the country.

Published work of Kheyri (4) lists several leafhoppers belonging to the genus *Circulifer* known to occur in Iran, including *Circulifer tenellus* (Baker) and *C. opacipennis* (Lethierry), both of which he reported as transmitting curly top to sugarbeets. *Circulifer tenellus* is the only known vector of curly top in the United States; *C. opacipennis* has previously been recorded as transmitting curly top to sugarbeets in Turkey (1, 2). Thus, Kheyri's work is additional proof of a second vector of the curly-top virus. Two additional species, *Neoliturus (= Circulifer) fenestratus* (Herrsch-Schaeffer) and *guttulatus* (Kirschbaum) are also recognized in Iran, but it is not yet known whether they can transmit curly top.

When I visited the Entomology Research Division field station in Yakima, Washington between August 27 and 29, 1969, I examined experimental sugarbeet plantings by B. J. Landis from five lines of Iranian sugarbeet seed I had sent him from Iran. (Presumably, all varieties of Iranian sugarbeet seed are of European origin and have no tolerance or resistance to curly top.) This experimental planting also included one U. S. hybrid sugarbeet, which is considered highly tolerant (resistant) to curly top. The six varieties were planted as single-row plots, each 50 feet long, seven replicates of each, arranged in randomized blocks. Each sugarbeet plant in each of the 42 plots was being examined for symptoms of curly top, and the number of plants in each plot was being recorded with a notation about the virus and the severity of the symptoms. In all, 1134 plants had been examined and rated. The plants grown from Iranian seed were moderately to extremely dwarfed and very chlorotic; also, the incidence of curly top was high, an average 74% compared with 18.1% in the U. S. hybrid variety. Moreover, the five Iranian varieties showed little difference in the percentage of beets with curly top and in the severity of symptoms (rated on a scale from 0 to 5, with 0 indicating no symptoms and five indicating plants dead or dying from curly-top virus). The average grade of severity of curly-top symptoms in the Iranian sugarbeets was 2.76; that in the U. S. variety was 1.21. In addition, the Iranian plants were poor compared with the U. S. variety and would have been practically a total loss so far as production was concerned.

The symptoms of curly top on sugarbeets in Iran are clearcut and definite, and I have no doubt they indicate the same kind of curly top known in the western United States. The Iranian sugarbeets I saw in Yakima, however, looked worse than most of those I had seen in Iran, probably because they were also infected with beet western yellows and, in most cases, with a mosaic, both debilitating virus diseases. However, it appeared to me that the curly top in Iran was causing symptoms in sugarbeets in that country comparable to those caused by curly top to the Iranian sugarbeets grown experimentally in Yakima, Washington.

Literature Cited

1. BENNETT, C. W., and AZIZ TANRISEVER. 1957. Sugar beet curly top disease in Turkey. *Plant Disease Repr.* 41: 721-725.
2. BENNETT, C. W., and AZIZ TANRISEVER. 1958. Curly top disease in Turkey and its relationship to curly top in North America. *J. Am. Soc. Sugarbeet Technol.* 10(3): 189-211.
3. GIBSON, KENNETH E. 1967. Possible incidence of curly top in Iran -- a new record. *Plant Disease Repr.* 51: 976-977.
4. KHEYRI, M. 1969. The leafhoppers of sugarbeet in Iran and their role in curly top virus disease. Sugarbeet Seed Institute, Karaj, Entomology Research Division, Tehran.

REGIONAL PULSE IMPROVEMENT PROJECT, TEHRAN, IRAN