

## PRELIMINARY INFORMATION ON CHICKPEA STUNT

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The so-called 'wilt complex' has been reported as a major problem in chickpea (Cicer arietinum L.) from several countries (1-8). The term 'wilt' is loosely used to describe premature drying of plants which has been attributed to various pathogenic and non-pathogenic agents including several fungi, viruses, insects, salinity and moisture stress. It is certain that more than one causal agent can induce 'wilt' symptoms in chickpea, and thus the diagnosis of 'wilt' and its etiology is rather confusing. At ICRISAT a systematic study of the etiology of the 'wilt complex' was initiated in 1974-75 to determine the major causes and establish priorities in research on control measures.

Distinctly stunted plants were frequent at the ICRISAT farm and at various other locations in India. Characteristic symptoms were shortening of the internodes and size reduction, with marginal browning and thickening of leaflets and stems. Branches were stiff, and proliferation of axillary branches was fairly common. In the later stages many of the cultivars developed a reddish tinge on leaves, petioles and stems. Infected plants were easily identified from a distance. The most characteristic symptom was conspicuous phloem browning which could be seen by making a shallow knife-cut in the collar region of the plant. The xylem showed no discoloration. No fungus or bacterium could be isolated from such plants. Many of these stunted plants dried prematurely, especially if infected when young. Even in the dried plants phloem browning could be seen. Symptoms were noticed in the field at the ICRISAT farm when the crop was about one month old and incidence increased progressively until podding stage. The disease sometimes appears late in the season: it was seen in New Delhi in January 1976, more than two months after planting. Based on the symptoms, the disease has been named chickpea stunt.

Typical symptoms of chickpea stunt were recently observed by the senior author in research plots at Eskisehir (Turkey) and Karaj (Iran).

The incidence of chickpea stunt in breeding plots at the ICRISAT farm was up to 2.6% during the last two seasons. Incidence in farmers' fields in central and north India ranged up to 90% and at other research stations up to 15%. Infected plants bear few pods and yield reduction on a per plant basis can be more than 80%.

Repeated attempts to transmit the causal agent through sap, graft and dodder have failed. For mechanical transmission various chemicals like sodium diethyldithiocarbamate (DIECA), sodium sulphite, polyvinyl pyrrolidone, 2-mercaptoethanol, singly and in combination, were used in phosphate buffer (pH 7.0) to prevent inactivation of phenols. Inoculations by the pin-prick method and by injecting the juice from infected plants were also unsuccessful, as were attempts to mechanically transmit the causal agent to various other plant species. These included: Arachis hypogaea (TMV-2), Cajanus cajan (S-8), Cucumis sativus (Burpee Pickling and National Pickling), Cyamopsis tetragonoloba, Datura stramonium, Dolichos lablab (Co-7), Glycine max (Jupiter), Gomphrena globosa, Lens esculenta, Nicotiana glutinosa, Phaseolus aureus (Acc#2545), P. lunatus (Bush Henderson, Jackson Wonder, Red speckled), P. mungo (H-21), P. vulgaris (Bountiful, Top Crop, Scotia, U.S. 5 Refugee, Pinto UI-111, Great Northern, S.G. Refugee, Tender Crop, Pusa Parvati),

Pisum sativum (Thomas Laxton, Rondo, Burpeena), Runner bean (Dutch case knife) and Vigna unguiculata (Early Ramshorn, C-152).

However the causal agent was repeatedly transmitted by Aphis craccivora. Aphids collected from and maintained on healthy chickpeas were fasted for 1-2 h prior to acquisition feeding periods of 30 min to 4 days. The inoculation feeding period was 48 h. Symptoms developed 20-45 days after inoculation and they usually died within one month after symptom appearance. The percentage success obtained in transmission in different tests ranged from 25-80.

Attempts to transmit the causal agent to plant species other than chickpea through Aphis craccivora have been unsuccessful. The various species tested were Arachis hypogaea (TMV-2), Dolichos lablab (Co. 7), Glycine max (Jupiter), Lens esculenta (local), Phaseolus aureus (Acc#2545), P. mungo (H-21), P. lunatus (Red Speckled, Jackson Wonder, Bush Henderson), P. vulgaris (Pusa Parvati, Bountiful, Pinto, Scotia), Pisum sativum (Burpeena), Runner bean (Dutch case knife), and Vigna unguiculata (C-152).

Typical external symptoms of the chickpea stunt could also be induced by an insect (unidentified) which girdles the stem at the collar region damaging the phloem, but no phloem browning occurs in such cases. Mechanical damage to the phloem at the collar region could also induce typical external symptoms of the stunt, but again without phloem browning.

Further studies are in progress on the causal agent-vector relationship with the objective of working out a resistance screening procedure. Simultaneously, efforts are being made to identify the causal agent.

#### References

- DASTUR, J.F. 1935. Gram wilts in the central provinces. Agric. Livestock India, 4: 615-627.
- ERWIN, D.C. 1958. Fusarium lateritium f. ciceri, incitant of Fusarium wilt of Cicer arietinum. Phytopathology, 48: 498-501.
- KAISER, W.J., and DANESH, D. 1971. Etiology of virus-induced wilt of Cicer arietinum. Phytopathology, 61: 453-457.
- McKERRAL, A. 1923. A note on Fusarium wilt of gram in Burma and measures taken to combat it. Agric. J. India, 18: 608-613.
- PRASAD, N., and PADWICK, G.W. 1939. The genus Fusarium. II. A species of Fusarium as a cause of wilt of gram (Cicer arietinum L.). Indian J. Agric. Sci., 9: 371-380.
- RAHEJA, P.C., and DAS, G.P. 1957. Development studies in crop plants. II. Effect of cultural treatments on the incidence of gram wilt. Indian J. Agric. Sci., 27: 237-250.
- SNYDER, W.C., PAULUS, A.O. and GOLD, A.H. 1956. Virus yellows of garbanzo. Phytopathology, 46: 27.
- WESTERLUND Jr., F.V., CAMPBELL, R.N., and KIMBLE, K.A. 1974. Fungal root rots and wilt of chickpea in California. Phytopathology, 64: 432-436.