

Letters to the Editor

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RELATION OF SOIL TEMPERATURE AND SOIL MOISTURE TO THE INCIDENCE OF COTTON ROOT-ROT UNDER FIELD CONDITIONS

1. Cotton is one of the important cash crops in Maharashtra State which contributes nearly 13 per cent of the State income. The area under cotton in the State is 62,57,758 acres and the State's annual average production is 12.2 lakh bales as per the 1965-66 census. The average yield of rainfed cotton in the State is 75 lb and that of irrigated cotton 200 lb lint per acre. There are at present 465 textile mills in India, of which 102 are in Maharashtra State.

2. In Maharashtra State the disease root-rot takes a great toll. In bad years the losses are higher and the value of the crop destroyed in India as a whole must be several millions. In severe cases the damage may be as great as 90 per cent of the crop.

3. The first report of root-rot of cotton in India was made by Butler (1918) from Dehra Dun, Kanpur and Madras. Uppal (1934, '35, '36) reported that the plants were found to contract infection at soil temperatures ranging from 30 to 34°C, but the manifestation of external symptoms depended largely on air temperature. Edmunds (1964) reported that there was no infection in plants supplied with 80 per cent or more available soil moisture and at 25 per cent available soil moisture, plants that bloomed 14-28 days before being inoculated were killed within 5-7 days or 3-5 days after inoculation at soil temperature of 35° and 40°C respectively.

Walker (1928) conducted a series of experiments and determined the optimum soil temperature range for the death of cotton seedlings as between 17° to 23°C, with a maximum at 34°C. Vasudeva

and Ashraf (1939) in their studies on factor influencing the incidence of the disease indicated that highest mortality was observed when soil temperatures maintained between 35° to 39°C. Moniz and Bhide (1963) reported that the disease reached maximum development at 28°C soil temperature and at 20 per cent soil moisture.

4. In the present studies it was revealed that the critical soil temperature and soil moisture for the disease was 23.70° to 27.59°C soil temperature in the morning, 26.10° to 32.77°C soil temperature in the afternoon and average soil moisture 24.5 to 28.5 per cent and these conditions were prevalent in the month of July.

The cardinal of the disease under the condition of this experiment was some where in the month of August when the maximum soil temperature was 27.89°C and minimum soil temperature 23.33°C and soil moisture 26 to 29.5 per cent. These conditions were prevalent in the first fortnight of August.

The optimal of the disease was found to be 27° to 31.36°C soil temperature and 18.5 to 20.5 per cent soil moisture. These conditions were prevalent in the second fortnight of August and October.

5. From the above results it appears that soil moisture and the soil temperature play an important part in the seriousness of the disease. These results described in this note pertain to actual field observations.

In order to authenticate the field observations the experiment was also carried out under controlled conditions in Wisconsin soil temperature tanks revealing thereby that soil temperature and soil moisture range given above for the initiation, development and optimal occurrence of the disease coincide with that of the controlled conditions.

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