EFFECT OF ORGANIC MULCHES ON THE HYDROTHERMAL REGIME OF SOIL AND GROWTH OF POTATO CROP IN NORTHERN INDIA

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SUMMARY

Possibilities of manipulating hydrothermal regime of soil with different organic mulches and their effect on the growth of potato crop was studied. Mulches like mat (Typha sp. interwoven into a web) and Pennisatum stalks lowered the soil temperature maxima at a depth of 10 cm by 1.5°C during autumn and by 3.5°C during spring as compared with control plots. Polyethylene mulch increased soil temperature maxima by 1.4°C and 2.2°C during autumn and spring, respectively and minima by 2.4°C during both the seasons. This treatment saved two and the former treatment one irrigation each out of a total of six irrigations applied to control plots. During autumn polyethylene gave significantly higher yield as compared with other treatments. During spring, when both polyethylene and coal dust increased soil temperature, yields were low under these treatments and the tubers were malformed with many sprouts. The yield as well as tuber size were governed by minimum soil temperature during autumn but soil temperature maxima influenced both yield and quality in the spring crop. The results of the study point out to the possibility of manipulating soil temperature in order to improve quality and yield of potato crop under the climatic conditions of North India.

Potato growth and development is affected by many edaphic factors and soil temperature is one of the most crucial. Several factors control soil temperature but only soil cover and soil moisture are subject to some manipulation. Potatoes are grown under diverse climatic conditions but these are generally considered a cool climatic crop. Plant respiration has been shown to increase at the expense of tuberization when the soil temperature exceeds the optimum level. Most of the workers, therefore, agree that optimum temperature for

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potato cultivation are around 20°C for the maximum and 15°C for minimum. Unfortunately, such an optimum soil temperature does not exist under natural conditions throughout the potato growing season in North India. There are three critical periods which influence potato yields in this region because of unfavourable soil temperatures. These periods are schematically shown in Fig. 1. In