

EFFECT OF *In-situ* CONSERVATION PRACTICES ON SOIL LOSS, RUN-OFF, MOISTURE CARRY OVER AND YIELD OF BROCCOLI UNDER RAINFED CONDITIONS OF MID HILL ZONE OF HIMACHAL PRADESH

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ABSTRACT

A field experiment was conducted to evaluate the effectiveness of *in-situ* conservation practices on soil loss, run-off, moisture carry over and yield of broccoli under rainfed conditions of mid hill zone of Himachal Pradesh. The treatments included Conservation Tillage, conventional Tillage (CT), CT + Black polyethylene mulch, CT + Bi-coloured polyethylene mulch and CT + Grass mulch. Un-mulched conventional tillage treatment resulted in maximum run-off (193.7 mm) and soil loss (8.19 tha^{-1}), whereas, black polyethylene mulch treatment recorded minimum run-off (56.63 mm) and soil loss (0.54 tha^{-1}). The application of black polyethylene mulch under conventional tillage reduced the run-off by 70.8 per cent and soil loss to the tune of 93.40 per cent over un-mulched conventional tillage treatment. Bi-coloured polyethylene mulch and grass mulch were found to be statistically at par with the black polyethylene mulch in respect of run-off and soil loss reduction. Weed count/ m^2 was also found to be least (18.41 weeds/ m^2) under black polyethylene mulch. Black polyethylene mulch recorded around 20 per cent higher yield as compared to the un-mulched conventional tillage treatment. Conservation treatments increased moisture carry over over un-mulched treatment to the range of 29.8 to 57.78 per cent.

Key words : Mulching, Run-off, Soil loss, Moisture carry over, Broccoli.

The growth and yield of broccoli is very much influence by availability of water which is a limiting factor during the growing season. Proper management of available water and conservation for longer duration in the root zone plays an important role in enhancing the yield and quality of broccoli. As broccoli is irrigated mostly by rains, which is erratic spatially and timely, so most of the times there is water deficit which affects the quality and yield. In mid-hills of Himachal Pradesh, low productivity in the rainfed areas is the main problem due to inadequate soil moisture content in the plant root zone during different growth stages of the plant. Moreover, uneven distribution of rains, occurrence of run-off and soil loss during rains further adds to the factors leading to low productivity. The bad effects of water deficit can be overcome by irrigation or adopting *in-situ* moisture conservation techniques such as use of mulches (Shinde *et al.*, 1980; Walter, 1988 and Gupta and Bhan, 1992). Mulching has also been identified by many workers as a method to provide a favourable soil environment by minimizing the crusting at the soil surface and keep it stable (Bennett *et*

al., 1964 and Mehta and Parihar, 1973). Soil surface crusting which generally occurs after every little shower due to loose and dispersed soil mass is another problem. Moreover, the soil underneath mulch remained protected from splash erosion during high intensity rains. Keeping all these points in view, the present studies were undertaken on response of different conservation practices on run-off, soil loss, moisture carry over, weed reduction and yield of broccoli under rainfed condition.

MATERIALS AND METHODS

The experiment was conducted at the experimental farm of department of soil science and Water Management, University of Horticulture and Forestry, Solan, during three seasons i.e. 2002-03 to 2004-05. The soil was gravely loam having bulk density, pH 7.20, organic carbon 2.01, maximum water holding capacity 33.82 per cent, available N 307.32 kg ha^{-1} , available P 358.40 kg ha^{-1} and available K 198.40 kg ha^{-1} . The experiment was started in October 2002 to April 2005 with broccoli cv. Green head. Two tillage treatments i.e. Conservation tillage and conventional tillage (CT) and three types of mulches viz. black polyethylene mulch, bi-coloured polyethylene mulch (grey/black) and grass mulch were