

Article Id
AL04135

IMPORTANCE OF SUMMER PLOUGHING IN AGRICULTURE

Email

deendayalbairwa2014@gmail.com

¹Deen Dayal Bairwa* and ¹Bhawani Singh Prajapat

¹Department of Agronomy, RCA, MPUAT, Udaipur-313001, India

Soil is main factor for crop growth and soil has property that is influence the crop growth and production. Soil property and crop production can be enhances by practise as soil ploughing. Summer Ploughing" is defined as the ploughing the field across the slope during hot summer with the help of specialized tools with primary objective of opening of the soil crust accompanied by deep ploughing and simultaneously overturning of the soil underneath to disinfect it with the help of piercing sun rays. To replenish the soil profile, do deep summer ploughing (off season tillage) with pre-monsoon rains (in May). It makes it easier to sow crops as soon as the southwest monsoon arrives. Tillage in the off-season enhances soil water content and decreases runoff. It also helps to keep pests and weeds at bay. Ploughs are used in farming to loosen or stir the soil in preparation for spreading seeds or planting. Ploughs were once pulled by working animals like horses or cattle, but now they are pulled by tractors (Alliaume *et al.*, 2013). The frequency and depth of ploughing depends on the severity of the weeds. Prior to the arrival of the monsoon, at most two summer ploughings are done, separated by 15-20 days. After the first monsoon rain, a third ploughing can be done using a harrow or cultivator to pulverize the soil and prepare field beds for sowing/transplanting.

When a soil is farmed or tilled, the aggregates in the soil are broken up and aerated. This exposes soil organic matter, accelerates its disintegration, and harms soil structure (Campiglia *et al.*, 2010). Cultivation that combines surface and subsurface soil dilutes organic materials and lowers the frequency of soil-borne diseases (Luna *et al.*, 2012; Kabir *et al.*, 2013). Ploughing improves the soil characteristics particularly preparation of good seedbed, elimination of weeds and as a result it affects the agronomical attributes like seed germination, seedling growth and crop yield (Kumar and Chopra, 2013).

Tool or Implements Used for Summer Ploughing

Local plough (Hal) and blade harrow (Bakhar) are traditional implements used for loosening of soil. These are simplest tools designed to break the topsoil and multi-passes are carried out to prepare seedbed. Mould board plough, disc plough, soil stirring plough, ridger plough, tool frames/carriers with mouldboard plough or tillage sweeps, etc. are improved implements designed for breaking soil. Ploughs are used to break soil and invert furrow slice to control weeds, etc.



Local plough (Hal)



MB plough



Disc plough



Soil stirring plough

Benefits of Summer Ploughing

- Ploughing breaking of hard crusted upper layer of the soil and deep ploughing the infiltration capacity and permeability of the soil increases which increases in-situ moisture conservation. Consequently plant roots will get more moisture with less effort.
- Summer ploughing improves soil structure due to alternate drying and cooling.

- Ploughing improves soil aeration which helps in multiplication of microorganisms. Organic matter decomposition is hastened resulting in higher nutrient availability to the plants.
- Increased aeration aids in the breakdown of herbicide and pesticide residues as well as damaging allelopathic compounds released by the roots of prior crops and weeds, which hinder the development of nearby plants.
- As the soil's ability to absorb precipitation grows, atmospheric nitrate combined with water penetrates the soil, increasing soil fertility.
- During the hot summer months, many insects and pests hibernate beneath the soil crust or stubbles. The strong rays of the sun enter the soil due to overturning during summer ploughing, killing the eggs, larvae, and pupae of soil borne insects and pests, reducing the risks of insects and pests on succeeding crops. As a result, the cost of insecticides and pesticides for the farmer is reduced.
- Exposed to the heat of summer, many dangerous bacteria spores and fungal microorganisms die. Because of the suppression of plant diseases caused by summer ploughing, farmers may save money on fungicides and insecticides.
- Plant parasitic nematodes are tiny creatures that live in the soil and damage succeeding crops to the point where total crop loss is a possibility. Nematode management can be accomplished by summer ploughing and crop rotation. Nematicides are rarely used to control nematodes because of their high cost, whereas summer ploughing does it for free.
- Weeds are uprooted by deep ploughing and overturning. As a result, the weeds' roots and stems get desiccated and die. As a result, one of the key advantages of summer ploughing is weed control and fewer weedicide treatment. As a result, competition between crops and weeds for the same plant nutrients is minimized, resulting in increased output.
- Ploughing a field over a slope destroys the continuity of the soil slope, diminishing the ability of the soil to carry run-off water. As a result, soil erosion is reduced. Clods cover more of the ground surface, limiting the effect of wind erosion on nutritious soil particles.

Conclusion

Plough change the soil environment and inhibiting the weeds germination and establishment and by moving their seeds vertically and horizontally. Deep plough also help

on storage of rain water and nutrients balance which help in getting higher crop yield and maintain the soil fauna and flora. So deep ploughing in summer is the best practice in field to enhance the soil properties and crop production.

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