Mulching: A novel boon impacting on soil health and crop production in agriculture

Shruti PG, Hanchinamani CN and Hadimani HP

Abstract Mulching is the scientific process of covering the soil to make more favorable conditions for plant growth, development and efficient crop production. Mulch term technically means “covering the soil”. Mulching is technically a process or practice of covering the soil/ground to make more favourable conditions for plant growth, development and efficient crop production. The enrichment of soil fertility and nutrient management is very important to get higher crop production and productivity which is gained by improving soil basically. Natural mulches such as leaf, straw, dead leaves and compost have been used for centuries, during the last many years the synthetic materials and plastics has altered the methods and benefits of mulching. The down regulation of evaporation also has a supplementary effect; it prevents the rise of water containing salt, which is important in countries with high salt content water resources. Thus, mulching helps to improve soil fertility of different agro climatic conditions. Awareness about mulching technology is still needed to farmers to improve their crop yield and for sustainable agriculture.

Keywords: development, evaporation, fertile, mulching, nutrients and soil

Introduction
Mulching is the process or practice of covering the soil to make more favorable conditions for plant growth, development and efficient crop production. Mulch term technically means “covering the soil”. Mulching is technically a process or practice of covering the soil/ground to make more favourable conditions for plant growth, development and efficient crop production. Natural mulches such as leaf, straw, dead leaves and compost have been used for centuries, during the last 70 years the synthetic materials and plastics has altered the methods and benefits of mulching. Recent data on research as well as field data available on effect of synthetic mulches make a vast volume of useful literature (Bilalis et al., 2002) [1]. When compared to other mulches plastic mulches are completely impermeable to water; it therefore prevents direct evaporation of moisture from the soil and thus limits the water losses and soil erosion over the surface. In this manner mulching plays a positive role in water conservation. The down regulation of evaporation also has a supplementary effect; it prevents the rise of water containing salt, which is important in countries with high salt content water resources. Crops are influenced by a variety of factors when mulching is used. Weeds are an important factor determining crop yields, and mulches are important for weed control (Bilalis et al., 2002 [1]; Radics & Bognár, 2004 [11]; Jodaugenë et al., 2006) [6]. Mulch can have positive or negative effects on crops apart from its impacts on weeds. Mulches reduce water evaporation from soil and help maintain stable soil temperature (Lal, 1974 [10]; Ji & Unger, 2001 [6]; Kar & Kumar, 2007) [9]. Sonsteby et al. (2004) established increased amounts of phosphorus and potassium levels in crop leaves in plots mulched with wood chips.

Organic Mulching: The influence of organic mulches on crop yield is unequal. Mulching improves plant growth, yield and yield quality (Sharma & Sharma, 2003 [13]; Singh et al., 2007 [14]. Gill et al. (1996) [4] state that yield increase with mulching was also greater for the early Agronomy Research 7(Special issue 1), 485–491, 2009 486 season crop. Some authors point out that increase in grain yield by mulching is attributed primarily to decrease in soil temperature and improved soil moisture regime (Lal, 1974) [10]. However, some mulches (straw, peat, sawdust) may negatively affect crops by drying up soil nitrogen due to a wide C: N ratio (Johnson et al., 2004 [8]; Sonsteby et al., 2004). According to the data of Gruber et al. (2008) [5], there was no effect of mulching with wood chips on crop yield.
The experiments of Kar & Kumar (2007) showed that higher potato yield and better crop growth were observed in plots with straw mulch. Potato yields were similar in mulched and unmulched plots, but the watermelon yield was higher in plots with straw mulch (Johnson et al., 2004). Döring et al. (2005) established no positive effect of straw mulch on potato yield. But the fact that yield was not significantly affected by straw mulch is mainly attributed to the relatively low amounts of straw applied.

The English word mulch is probably derived from the German word Molsch.

**Moisture Conservation:** Plastic film with its moisture barrier properties does not allow the soil moisture to escape Water that evaporates from the soil surface under mulch film, condenses on the lower surface of the film and falls back as droplets (Kar & Kumar 2007). Thus moisture is preserved for several days and increases the period between two irrigations. The irrigation water or rainfall either moves into the soil thru holes on the mulch around the plant area or through the un-mulched area.

**Weed Control:** Black plastic film does not allow the sunlight to pass through on to the soil. Photosynthesis does not take place in the absence of sunlight below black film hence, it arrests weed growth (Singh et al., 2007).

**Types of mulch film in agriculture**

A wide range of plastic films based on different types of polymers have all been evaluated for mulching at various periods in the 1960s. LDPE, HDPE and flexible PVC have all been used and although there were some technical performance differences between them, they were of minor nature. Owing to its greater permeability to long wave radiation which can increase the temperature around plants during the night times, polyethylene is preferred (Johnson et al. 2009). Today the vast majority of plastic mulch is based on LLDPE because it is more economic in use. Generally polyethylene mulches are linear, LDPE and HDPE. And Thickness ranges from -0.015- 0.050mm. (15-500microns).

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<th>Selection of mulch</th>
<th>- Perforated mulch</th>
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<td>The selection of mulches depends upon the ecological situations and primary and secondary aspects of mulching Rainy season</td>
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**Basic properties of mulch film**

a. Air proof so as not to permit any moisture vapour to escape.

b. Thermal proof for preservation of temperature and prevention of evaporation

c. Durable at least for one crop season.

**Importance of parameters of the plastic film**

a) **Thickness** Normally the thickness of the film does not affect the mulching effect except when it is used for solarisation. But some of the recent references do indicate the impact of film thickness on crop yield. Since it is sold by weight it is advantageous to use as thin a film as possible but at the same time due consideration should be given for the longevity of the film. The early mulch film used were of 60-75 micron (240-300 gauge) thickness, and today it is possible to have 15 micron thick film due to advent of film extrusion technology. These films are mechanically weak, as shown by their easy tearing when pulled tension.

b) **Width** This depends upon the inter row spacing. Normally a one to one and half meter width film can be easily adopted to different conditions.

c) **Perforations** The perforations may be advantageous under some situations and disadvantageous for some other situation. The capillary movement of water and fertilizer distribution will be better and more uniform under unperforated condition. But for prevention of water stagnation around the plants, perforation is better. But it has got the disadvantages of encouraging weed growth.

d) **Mulch colour** The colour of the mulch affects i. Soil temperature ii. Temperature of air around the plants iii. Soil salinity a. Due to lesser quantity of water used b. Due to reduction in evaporation and prevention of upward movement of water.

**Transparent film** - Deposits more salt on soil surface Black film - Restricts water movement and upward movement of salt is reduced. iv. Weed flora - Black film v. Insect control - Opaque while film acts as golden colour and attracts insects

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**References**


