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Geotextile and its Importance in Agriculture: A Review Study

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ABSTRACT

Geotextiles are lightly fabric made from jute, coco coir or any natural plant fibers. Geotextiles a natural product are eco-friendly and biodegradable in nature and act as useful ameliorative to eliminate the soil related constrains of crop production. The results of biodetorioration of cellulose fiber are a reduction of the polymerization degree and thus a textile strength loss. It also helps to protect the most vital natural resources of soil and water from various degradation processes soil conditioner are equally effective in erosion control, stabilization of soil slopes and increasing water retention capacity also improve crop productivity. It contains natural substances for plant growth and helps to serve and release of essential plant nutrients through lignin decomposition.

Keywords: Geotextile, soil properties

Natural geotextiles degrades to form organic mulch and held in weak establishment of vegetation. Jute geotextile degrades in 1 to 2 years, sun hemp, coco coir geotextile and Banana leaf fiber, geotextile degrades 1n 2 to 3 years. Increasing awareness in future of applying different type of geotextiles for preventing soil degradation and maintaining suitable crop production. The use of different types of geotextiles management practices involving organic resources and shows beneficial effect on improving soil fertility, mentioned soil health and sustainable crop production scientific information's in relation to the above are reviewed hear under. Application of geotextiles is location specific so in addition to the characteristics of geotextiles, identification and application of geotextiles depends on soil type, soil compaction, moisture content, liquid limits, plasticity index, bulk density, soil pH, iron/ calcium content, clay / silt and sand composition, land sloping and hydrolic action etc.

Geotextiles used for re-vegetation and soil stabilization and wherever the upper layer of the soil has to be preserved from wind and water erosion and conserved soil moisture during the establishment of a vegetation cover.

Types of geotextile

1. **Woven type:** Commonly found geotextiles are of the woven type and are manufactured by adopting the techniques which are similar to weaving usual clothing textiles. This type has the characteristic appearance of two sets of parallel threads or yarns. The yarn running along the length is called warp and the one perpendicular is called weft.
2. **Non-Woven Geotextile**: Non-woven geotextiles are manufactured from either continuous filament yarn or short staple fiber. The bonding of fibers is done using thermal, chemical or mechanical techniques or a combination of techniques.

Effects of Geotextile in agriculture

Khistaria *et al.* (1994) who showed that increase of crop productivity on the application of different type of mulches and geotextile on groundnut crop.

Booth *et al.* (2005) conclude that lowering bulk density and increasing the porosity and water holding capacity by the application of palm leaf geotextile for maintain of soil quality and soil conservation.

Tiwari *et al.* (2000) describe that the BD can me improve and the improvement of water retention capacity by the application of the different types of geotextile.

Divies *et al.* (2006) shows that effects of increases crop productivity and water use efficiency by the application of plum geotextile on different crop at the Hilton experimental site over control.

Biswas *et al.* (1970) reported that the nature of organic matter played an important role in the development soil structure owing to differential nature of by products produced during the process of decomposition.

Rajagopal and Ramakrishna, (1997) describe properly about to improve the soil organic carbon (SOC) and soil by the application of geotextile.

Adhikary *et al.* (2018) suggested that suggest that application of each of geotextiles increased growth and yield of groundnut crop. It also helps to improve physical properties in soil particularly the structural status in soil and also enhanced the water use efficiency by the crop.

Effects of geotextiles as a mulching

Khistaria *et al.* (1994) reported that In a field trial on medium black soil in the *kharif* [monsoon] seasons of 1982-84 at Targhadia, Gujarat, mulches of soil, pearl millet (*Pennisetum glaucum*) stubble, pearl millet straw or groundnut husks gave groundnut pod yields of 1.17, 1.25, 1.27 and 1.15 t/ha compared with 1.10 t from the control. Average soil moisture content in the 0 - 25 cm soil layer was increased by mulching.

Nag *et al.* (2008) reported that mulch is a layer of material spread on top of the soil to conserve soil moisture, discourage the growth of weeds, help prevent erosion and prevent large fluctuations in soil temperature. Mulch modifies the soil micro-climate around the growing plants. Jute geotextile being a woven/non-woven knitted structure of natural fibre is used in various geo-technical, civil engineering and soil conservation applications.

Sharma *et al.* (2010) reported mulching with vegetative materials is a highly beneficial and widely-investigated agro-technique in rainfed areas but the adoption of this practice has been constrained due to non-availability of mulch biomass locally. Live mulching with fast-growing annual green manure legumes like sun hemp (*Crotalaria juncea*) or prunings of *Leucaena leucocephala* grown as hedge rows can be done for moisture conservation as well as nutrient cycling in the maize-wheat cropping system.

Dayal (1989) reported that in a trial in 1989 with groundnuts cv. Girnar 1 give 10 (recommended) or 7 irrigations, mulching with 5 t wheat straw/ha increased the number and wt of pods/plant by 16 and 23%, resp., and gave av. pod yields of 2.22 t/ha compared with 1.80 t without mulch. Yields increased with increase in number of irrigations. Mulch + 10 irrigations gave the highest yield of 2.64 t. Mulch produced by soil loosening also increased yield.

Effects of geotextiles management on soil properties

Kaku *et al.* (2007) reported that Geotextile mulch has become popular recently in the installation of landscape ground cover, because it provides both suppression of weeds and maintenance of soil conditions desirable for cover-plant growth

Bhattacharyya *et al.* (2010) studied that despite geotextile-mats having the potential for soil conservation; field studies on the effects of geotextiles on soil properties are limited.

Vishnudas *et al.* (2006) reported that this paper presents the results of a field experiment conducted in Kerala, South India, to test the effectiveness of coir geotextiles for embankment protection.

Davies (2005) reported that the geotextiles constructed from *Borassus aethiopum* (blackrhun palm) leaves were investigated for their effectiveness in decreasing water erosion.

Shulga *et al.* (2007) reported that the lignosulphonate/polymer complex, in which the macromolecules of both components are linked together by physico-chemical bonds, has been applied as a new effective lignin-based soil conditioner (LSC). It has an adhesive affinity both for mineral soil particles and the organic surface of lignocellulosic mulch.

Otani *et al.* (2009) reported that Ground cover plants are useful for weed suppression on levee slopes. However, weeding is necessary until the slopes have covered with ground cover plants. In farm village, plant organic matter such as bark, chaff and wood chips are not used effectively.

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