

The Role of the Stubble Much on Control of Dry Farming Lands Soil Temperature and Its Economical Efficiency

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ABSTRACT

One of management plans of dry farming is fallowing. This practice is conducted in dry and semi-dry regions of water in the soil. In these regions, because of intense radiation of the sun particularly in summer season, the evaporation rate is more. The stubble mulch which appears because of residue remaining on soil level in contrast with soil free of mulch could decrease soil temperature and also alleviates the of avoidance temperature fluctuations as well as could avoid remarkable fluctuation of circadian and seasonal temperature of soil, more maintenance of water and decreased permeability of soil, deliberation of weeds, avoiding of erosion and decreased soil salinity and finally decreased evaporation, surely, decreased evaporation causes to increased humidity storage in soil and consequently leads to increased yield which is important economically.

Key words: Dry farming, Erosion, Fallowing, Evaporation, Permeability of soil, Soil salinity, Stubble mulch, Temperature of soil

1. INTRODUCTION

The temperature of soil directly supplied by absorbed irradiation of the sun and could influences on seeding date, germination process, plant growth season length, particularly, in cold regions, transmission and displacement of humidity in the soil and finally, physiological actions of plant and its value is function of temperature that one type of soil could receive from the sun, all of sun's radiance don't absorbed by soil, some of them return as reversible radiance to atmosphere which in dry farming lands, the existence of stubble mulch causes to this process in fallowing year. But, the surface section of a bald soil in the fair sunny day influenced by energy absorbing power of same soil and its value is determined based on difference E between absorbed or input temperature (A) and output one (B) ($E=A-B$). The main source of output heat from the soil is return radiance but evaporation of water from the surface and depth of soil, chemical and biological endothermic processes, temperature transmission from the soil to the air and could influence of output value.

The input (A) and put (B) heat is variable, thus temperature budget of soil could be positive or negative, i.e. if pure absorbed energy exceeds the temperature which soil loses at that moment, the temperature budget is positive, it occurs normally during day hours, in these times the temperature of surface section of soil generally is higher than underground temperature and excess temperature gradually more to lower parts of soil which is important in the fallowing year in order to evaporation of soil's water.

On the other hand the presence of stubble mulch in fallowing year, in addition to control of soil temperature in hot seasons causes to adjustment of soil temperature in cold season, while the surface of soil be free of plant and while surface of soil is exposed to sun radiance and wind, the evaporation of water is directly and entirely done from surface of soil and of the surface maintains bald the water lose is significance in dry farming regions.

A. Effects of Stubble Mulch on Soil

The stubble mulch witch appears because of remaining reside on the surface of the soil in contrast with soil free of mulch could decrease soil temperature and also causes to avoiding of extruding fluctuation of circadian and seasonal temperature, more maintenance of humidity in the soil, increased permeability of soil, debilitation of weeds, avoidance of erosion and decreased soil salinity and finally decreased evaporation. The results of experiments showed that by remaining 5-8 ton of stubble in one hectare, the temperature of soil in depth of 2.5 cm decreases 3-6 centigrade and in depth of 10 cm, 2-4 centigrade, while the mulch value be heavier (about 20 ton / Hectare) again, the temperature of soil decreased more [1]. One of management programs of dry farming is fallowing. The fallowing is done in dry and semi – dry regions with aim of the water reservation in the soil but in these regions, because of intense radiation of sun particularly in summer, the evaporation rate is higher, the presence of stubble mulch as controller of soil temperature is important. It has been reported in fallowing year, the nitrate of soil increased because of nitrification process and the yield potential of forming land providing on adequate reservation of moisture, improve approximately. [11].

The mulch's at the first level is utilized to adjustment of regional changes of locale and at the next levels in order to adjust, soil temperature with help to maintenance and nonplusing of soil temperature in spring and subserviently with cooling down the soil and adjustment of temperature and optimization of it during hot and variable conditions autumn and maintain of water in the soil by slowing evaporation from the soil [2]. It has been reported that in untreated soils and by maintaining plant residues, the earthworms grow well and the deep and various operation could decrease up to 90 percent of them, during more hot times of summer and cold ones of winter, worms become inactive, the earthworms could be increased by reduction or omission of treatment operation in autumn and non- utilization of moldboard plow with maintaining plant mulch. One suitable population of earthworm in the field could process about 20 tones of surface soil and in some special situations, material return 200 ton / Hectored and earthworms secrete growth factor. The temperature changes which appear because of topographic factors influence on plant growth rate and soil type that created. For example, the south slopes in North hemisphere absorb more sole energy, falling in these slopes is low efficient in growth of plants because of higher soil temperature, evaporation and perspiration. Thus, their erosion is more than North slopes and also temperature changes through successive rotation of frosty periods and melting of earth and regions, speed of water current is high on surface and consequently, soils absorb low and inevitably the surface current intensifies [1]. The solar radiance, partial humidity and air current are of climate factors which are influential on evaporation, perspiration. The solar radiance provide necessary energy to evaporate water and may directly influences through direct radiance on plant and/ or soil or indirectly through heating air which passes on evaporator surface on evaporation and perspiration[4].

The advantages of water mulch in summer, is creating of temperature buffer state for soil, in a sense, causes to soil being cold, during day and hot during, the advantage of it, is leveling of soil surface in treatment of soil and keeping plant residues in it's levels through effect on reflection of solar radiance energy and the speed of temperature exchange on soil surface causes to change of soil temperature [5].

It has been reported that, unrevealing of soil surface through treatment of soil causes to decreased energy reflection and also decreased heat capacity and consequently the temperature of surfaced part of soil increases [12].

In protective treatment of soil, should be created significant change in temperature without any change in special weight of soil, because the plant residues directly influence on reflection of solar energy and wind speed in the vicinity of surface of earth and indirectly on evaporation of water from the soil [13]. Based on Hay and Colleges report [14], temperature/ day number above 10c and depth of 5cm of soil is more in treatment of tillage and also the existence of plant residues on the surface of tropical and semitropical regions causes to high temperature of soil. For example, the maximum temperature of soil in depth 5 cm in no. treated treatment in Nigeria decreased 11 and 9c two weeks following cultivation of corn and soybean respectively [15]. In semiarid region: North of India also was observed which the temperature in the depth of 10cm of soil in corn field rising by using of stubble mulch system decreased exponentially [16].

In fallowing of dry and hot regions, the harvest of crop should be done accurately, wheat and barley should be harvest from the height of 20-25 cm of soil surface and in order to maintain humidity and soil maintenance as well as because of high temperature in hot season and regional winds, should left stubbles of field surface. The remaining stubbles on the surface prohibit from direct radiation of the sun to the soil surface and have been established that, it decreases 2-4c soils temperature in depth of 10cm and consequently avoids from evaporation of soil humidity [9]. As temperature increases, evaporation and perspiration rate also increase thus, humidity content which is adequate for cold climate, possibly wouldn't be adequate for hot region, this situation intensifies with hot temperature, The daily fluctuation of temperature influences on production of plant corps, for example, some of grasses such as sorghum halfpence and *Cynodom dactyl* on geminate well in situations which daily fluctuation of temperature is more than in fixed ones, thus the presence of stubble mulch in fallowing year along and the temperature adjustment of soil cause to control some weeds growth In agriculture of an arable region, determination of climate difference of any arable piece is suitable In any region of agriculture, measurement of climate factors of any piece is difficult and obtained data from field center is taken as reprehensive of more pieces, The fair sky of dry regions nights makes possible the output of significant rate of radiance from the earth, the fast cooling of earth of night causes temperature reversion, the cold air in the vicinity of soil would be heavy and doesn't rise, in dry regions with average latitude, the deadly frostiest are determine of growth season length which practically constrains to span between last frosty in the spring and first one in the autumn, as this potential be lower, the plant items which could be cultivated would be early and their potential function would be low thus utilization of stubble much in adjustment of temperature whether in summer in order to control evaporation of soils water or in winter for control intensive frostiest is inclusive the direct evaporation from soils surface amounts to as water exit from plant and its lose. The accurate treating practices and respect to management rules of dry farming lands in fallowing year could be useful in evaporation control. two researchers should that, based on collected data, only 45-47 percent of total rate of falling was used to product crop while 8-25 percent, has been lost because of waste [10] such observations and examinations indicate that plant residues (stubble mulch) is used as atoll in order to maintain water through evaporation mitigation any reduction in water lose rate because of evaporation, waste or depth penetration causes to

increased humidity reservation of soil and consequently, leads to high function which is importance economically.

2. MATERIALS AND METHODS

In order to study role of stubble mulch in control soil temperature in dry farming lands, the experiment was conducted in agriculture institute field of Tabriz by author as following.

Experiment time octobr2010 10-12 o'clock
Depth of experiment soil: 10xom
Type of soil: Sandy clay
Measurement tool: thermometer special to soil
Reside value in hectare: 14 tone
Treatment 1: bald soil
Treatment 2: soil with stubble mulch
Iteration: 3

3. RESULTS AND DISCUSSION

On of management plans of dry farming cultivation in order to conserve humidity of soil is following. From main problems of these lands, could refer to intense irradiation of sunlight particularity in summer and evaporation.

The stubble mulch which causes because of residue remaining on soil surface contrast with no mulch soil could decreases temperature, as mulch behaves as a insulator on the surface and by creating microclimate and avoids from more permeability of solar irradiance to soil and remains soil, cold and consequently, decreased temperature causes to mitigation of evaporation and increased humidity reservation in the soil and consequently raised yields.

In conducted experiment, temperature difference between bald soils and mulch ones is 5cd. It shows that, use of stubble mulch is influential in temperature alleviation, on the other hand causes to temperature adjustment of soil and temperature fluctuation decreases. With regard to some weeds germinate well in situations which temperature Punctuation is high, thus stubble mulch in fallowing year, in addition to decreased temperature of soil, causes to mitigation of evaporation and by adjustment of soil temperature lads to control growth of some weeds.

It is subjected that farmers of dry farming, to keep fallowing year of self lands as stubble mulch and avoid from treating as inverting soil and lying soil, baldly. The use of such system by formers, in addition to control primary costs, causes to high income and improvement of their economical status.

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