



Research Article

Importance of Mulching In Dry Agricultural Areas For Soil Moisture Storage

Meryem KUZUCU

Kilis 7 Aralık University, Technical Sciences Vocational School, Department of Plant and Animal Production, Kilis, Turkey.  ORCID 0000-0003-1424-0614.

Abstract

In our country, there are many problems in agricultural production as a result of the effect of the change in climatic conditions and the lack of precipitation, as well as the malnutrition and maintenance procedures applied by our producers. Inadequate soil fertility and water generally cause reductions in crop yield. As a result of the high temperatures seen in summer months, the losses in soil fertility through evaporation create stress conditions for the plant as well as low yield. In order to reduce these conditions, it is necessary to store the winter precipitation in the soil in arid areas and to ensure that this accumulated rain water reaches the plants in the dry period. Mulching should be done to maintain soil moisture and fertility, to reduce evaporation from the soil surface and to keep the root zone of the plant moist and cool. All materials used to cover the soil are called mulch. It is known that mulching has many benefits in plant breeding. Under natural conditions, residues such as fallen leaves, branches, etc. form a natural mulch cover on the soil surface in the area covered with vegetation. In this study, the benefits of mulch applications made in order to save water and maintain soil moisture in areas with water shortage were evaluated.

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Kuru Tarım Alanlarında Malçlamanın Toprak Nemi Depolanmasındaki Önemi

Özet

Ülkemizde iklim koşullarının değişimi ve yağış azlığının etkisiyle ve aynı zamanda üreticilerimizin uyguladığı yetersiz beslenme ve bakım işlemleri sonucunda tarımsal üretimde birçok sıkıntı yaşanmaktadır. Toprak verimliliği ve suyunun yetersiz oluşu genellikle ürün veriminde azalmalara sebep olmaktadır. Yaz aylarında görülen yüksek sıcaklıklar neticesinde, buharlaşma yolu ile toprak neminde yaşanan kayıplar verim düşüklüğünün yanı sıra bitkide stres koşulları da yaratmaktadır. Bu koşulları azaltabilmek için, kurak alanlarda kış yağışlarını toprakta depolamak ve bu biriktirilen yağmur suyunun, kurak geçen dönemde bitkilere ulaşmasını sağlamak gerekmektedir. Toprağın neminin ve verimliliğinin devamı için, toprak yüzeyinden buharlaşmayı azaltmak ve bitki kök bölgesini nemli ve serin tutabilmek için malçlama yapılmalıdır. Toprağın üzerini örtmekte

Anahtar Kelimeler
Malçlama,
tarımsal kuraklık,
suyun muhafazası

kullanılan tüm malzemelere “malç” adı verilmektedir. Malçlamanın bitki yetiştiriciliğinde birçok yararı olduğu bilinmektedir. Doğal koşullar altında bitkiyle kaplı bir alanda, dökülen yaprak, dal vs. gibi kalıntılar da toprak yüzeyinde doğal bir malç örtüsü oluşturmaktadır. Bu çalışmada, su sıkıntısı çekilen alanlarda, su tasarrufu sağlamak, toprak nemini korumak amacıyla yapılan malç uygulamalarının yararları değerlendirilmiştir.

¹ Corresponding Author Email: mkuzucu@kilis.edu.tr

INTRODUCTION

With the lack of precipitation experienced today, plants have difficulty in performing their vital activities and producing products. High temperature and evaporation, insufficient precipitation and ways of eliminating the effects of drought should be sought. These harmful effects can be reduced by covering the soil surface with various materials. Mulching is a very useful agricultural practice for soil moisture conservation. By mulching; By preventing intense sunlight, the plant stays cool and at the same time weed growth is prevented. Tillage practices are reduced. This means less tillage costs and therefore soil structure is protected with mulch. Evaporation on the soil surface is reduced and soil moisture is preserved. The movement of salts in the soil towards the surface is prevented and the soil salinity problem can be reduced by mulching.

Mulch covers that maintain soil moisture reduce the need for water, reduce the need for irrigation, and promote crop yield. It increases the soil temperature and the development and growth activity of the plant is increased. It covers the soil surface with mulching and protects it against water and wind erosion. Different materials used as mulch also benefit the physical, chemical and biological properties of the soil. Mulch covers with organic content decompose over time, increasing the organic matter of the soil. With mulching, the effect of sunlight is reduced, moisture in the soil is preserved and microorganism activity in the soil can occur intensively. [1], Weeds present great challenges in growing any crop, there are about 10 types of weeds all over the world that grow on almost every type of crop and affect its yield. With other practices, one of the main practices followed today is "mulching" as it is cheaper, environmentally friendly, safe, applicable and reproducible. Mulch retains soil moisture and reduces the plant's need for water.

They also said that by increasing the yield of the crop, it encourages the early ripening of the crop. Organic mulch applications are very important for the soil and the plant. Mulching done before the winter months allows the soil to cool down later and protects the soil from erosion due to the intensity of rain and snow. Applying mulch before the summer months in regions with low rainfall protects the soil from the negative effects of heat and drought by preserving the soil moisture in dry periods. Mulch covers contribute to product yield by stopping the surface flow in sloping agricultural lands or directing it to the planted area, meeting the water need in agricultural production. It has been reported that the total amount of water resources in the world is 43 thousand 750 cubic kilometers per year, and the usable underground and surface water amount in Turkey is estimated to be 112 billion cubic meters [2]. The amount of water per capita in our country it is known that the average is 216 m³, and it is predicted that this value will continue to decrease in the following years. Our country is not a water-rich country, it is a water-poor country that will struggle with the drought problem due to the climate change experienced in recent years. However, our country is located in a semi-arid region of the world and the annual precipitation average is 650 mm. There are also significant differences between regions in our country in terms of precipitation amount and distribution. While precipitation reaches 2500-3000 mm in some regions, it cannot exceed 250-300 mm in some extreme years in some regions. This rainfall irregularity and scarcity cannot provide the plant with the desired amount of water, especially in agricultural production, during periods when irrigation water is needed. The development of our country's water resources, their planning with scientific and technical approaches and taking care to protect the environment while doing these will continue to gain greater importance and value today and in the future.

In the case of current water use, it is stated that an estimated two-thirds of the world population will face water shortage in 2025 [3]. [4], in their study on loess-containing and dry sloping lands, reported that 5-10% of precipitation is lost by runoff, 45-50% is consumed by plants, and 45-50% evaporates. Therefore, they reported that mulch applications are necessary in dry agricultural areas to preserve soil moisture, collect rainwater, stop runoff, and reduce evaporation. [5], the negative effects of global warming and climate change on agriculture are more effective in dry agricultural lands. In regions with low rainfall, water should be used sparingly and alternative practices that can save water should be started. While the search for agricultural land and its problems are

constantly increasing all over the world, it is seen that marginal areas are used more in agriculture today. Most of these areas are located in arid and semi-arid zones, where there is usually irregular rainfall and water is lost as runoff. [6], In our regions where agricultural production is carried out in semi-arid areas and dry conditions, rain water should be collected and evaluated in order to combat drought and grow crops. In order to conserve the water in the soil and for the plant to benefit from it, we must cover the soil surface and mulch it and collect the rain water and deliver it to the plant, while conserving the soil and water. In this study, the importance and necessity of mulch covers used in agricultural production in soil moisture preservation and soil erosion prevention were evaluated.

1. SOME MULF COVERS USED IN AGRICULTURAL PRODUCTION

The type of material used in mulching determines the life and value of the application. Mulch covers made from organic waste replace the addition of organic matter to the soil as it rots. The organic matter of the soil is a measure of its fertility. The more fertile the soil, the higher the crop yield indirectly. In agricultural production, it is necessary to preserve the fertility of the soil and not leave an area deprived of plant nutrients for the next period. Therefore, fertilization is the most important way to increase yield. By using the most suitable organic and inorganic fertilizer combinations, the yield in agricultural production can be increased [7]. Another mulch material, inorganic mulch materials; They are long-lasting, devoid of nutrients, but can be used efficiently for a longer period of time. The materials used in mulching can be very diverse. These are waste straw and straw of cereals, wood shavings, paper, cardboard, dry leaves, bark, ground dry pruning residues, Freshly cut grass, fresh leaves and ground fresh pruning residues, plastic covers, stone and gravel mulch cover, live mulch covers, Green manure plants can also be used as mulch cover.

1.1 Plastic Mulch Covers

Plastic covers used as mulch material provide better warming of the soil and increase seed germination, vegetative and root development of seedlings compared to uncovered soil. With the plastic mulch cover, the development of weeds is prevented and labor costs are reduced. Drying of the soil surface and formation of a cream layer do not occur with this inorganic mulch cover. Thanks to the plastic mulch covers, the evaporation of water from the soil surface is prevented, water saving is provided and therefore soil moisture is preserved (Figure 1). [8], in a study titled 'The effect of different planting times and mulching materials on flower quality' conducted in China, M0-no mulch, M1-Black plastic mulch, M2-Silver plastic mulch, M3-Clear plastic mulch, M4- Pine needle cover and M5- Grass cover materials were used. Plant height (84.48 cm), plant width (48.39 cm), number of flowers per plant (47.89), flowering time (51.53 days), flower diameter (4.73 cm), fresh weight (291.67 g), flower yield per plant (134.73g), the best results were obtained with the use of Silver plastic mulch. [9]. in semi-arid regions of China; In their studies on corn plant, they followed the soil moisture and water use efficiency by applying gravel mulching and plastic mulch combinations on the ridges and furrows. On bare ridges, the average runoff efficiency is 7%; The runoff efficiency on the ridges covered with plastic cover was 87%. Ridges covered with plastic cover and furrows covered with gravel cover performed better soil moisture retention than bare ridges and furrows. [10], under semi-arid conditions, ridges and furrows were used together with plastic mulching, rain water was used with mulching in corn production. Corn grain yield increased between 4.010-5.297 kg/ha compared to the control subject in the ridges and furrows covered with plastic cover.



Figure 1. Use of Black Plastic Cover in Strawberry Cultivation

In addition to these beneficial uses, plastic covers have also been successfully used in soil moisture conservation projects in order to increase efficiency in agricultural production. They were evaluated to reduce the detrimental effects of drought in plants grown under dry conditions by performing runoff towards the plant root zone (Figure 2). [11], has the characteristics of protecting soil and water, increasing the yield of the crops that come after it, as well as being grown as a fodder plant and animal feed. Plastic covers are still used successfully in the world and in our country to collect and preserve rainwater. In the use of plastic mulch, bare soil is also there is no sediment loss or weed damage from the surface. Mulch covers are useful materials used for erosion control as well as contributing to plant growth by protecting soil moisture. [12], investigated the effects of different sizes of ridge and furrow widths and combinations of bare and plastic mulch cover applications on potato yield in semi-arid areas by utilizing rain water. In the study, the highest potato production was obtained from the application of plastic mulch with 0.45 m ridge and 0.60 m furrow, fed only by rain water. With this application, very successful soil moisture conservation has been achieved.



Figure 2. Plastic Mulch Cover for Rainwater Containment for Pistachio Trees

In a sloping pistachio orchard established under dry conditions, a plastic mulch cover was used to retain soil moisture to encourage the growth and development of young trees. An image from the rainwater harvest Negarim microcatchment project, in which plastic cover was used to increase runoff and store rainwater in the plant root zone, is included (Figure 2). The most preferred mulch cover in our country and in the world is plastic mulch covers, and these covers give the most successful results in combating erosion. Many stormwater containment studies have been conducted using plastic mulch cover. [13], investigated the effects of pre-sowing irrigation and plastic film and mulch application on yield in summer wheat in semi-arid and loess plateaus of China. The best grain yield was obtained in the plots using plastic mulch cover. [14], investigated the effects of rainwater storage on soil moisture and plant growth in semi-arid loess soils of China between 2002-2004 in their study on the growth of the tree named Tamarix. Trial subjects consisted of control, embankment, plastic mulch, bare ridge and bare furrow, plastic-covered ridge and bare furrow, and plastic-covered ridge and gravel-covered furrow. The combination issue of plastic-covered ridge X gravel-covered furrow provided higher (18-137 mm more) soil moisture retention than the control. Values related to plant growth, mulch applications increased by 70% in height, 57% in crown diameter and 79% in trunk circumference, compared to control. According to the results of many studies; [12-15], reported that by reducing evaporation with plastic cover applications, the need for water of the plant is partially met and water saving can be achieved.

1.2 Stone – Gravel Mulch Covers

Mulch covers consisting of stones and gravel cover the soil surface, provide shading and undertake the task of keeping soil moisture. Stone covers provide good soil, especially in sloping areas.

Provide containment. As a result of the studies, it is known that stone mulch covers minimize the sediment loss from the soil surface. It should be noted that these stone mulch covers are usefully used for erosion control and provide significant protection (Fig. 3). Images from the rain water harvesting projects implemented in orchards where the root zone of the plant is covered with stone mulch and the runoff waters are collected in the root zone are given in Figure 3. Various stone mulch covers have been used successfully in projects aiming to collect rainwater in the soil. Stone and gravel mulch covers can be used successfully to combat erosion, but do not provide weed control very well. There are gaps between the stones, albeit very few, and weeds are growing between the stones. [16], used a plastic and gravel mulch cover to collect rainwater from the slopes in their study in which they followed the growth and development of the shrub *Caragana korshinskii* in dry conditions. In semi-arid regions of China, combinations of plastic cover and gravel cover successfully retained rainwater in the soil relative to the

control, and the plant took advantage of this to show good growth.



Figure 3. Stone Mulch Cover for Rainwater Containment for Fruit Trees

Sometimes, stone and gravel mulch covers can be designed in various ways to reduce the slope in the direction of the slope of the land, the purpose of these applications; collecting rain water, giving it to the plant and at the same time stopping the flow of precipitation that may cause erosion. [17], reported that stone mulch cover increases infiltration, while reducing soil losses caused by runoff and leaching and splashing. [18], investigated the effects of pebble-stone mulch, plastic mulch, rainwater harvesting at different rates of furrows and ridges on watermelon yield and water use efficiency in the semi-arid region of China. In the research, the highest yield was obtained in the subject where the ridge: furrow and ridges are covered with plastic cover and the furrows are covered with stones and gravel in the ratio of 1:1. In the study, it was determined that evaporation decreased by 56-58% with the application of stone and gravel mulch, by 74% with the application of plastic mulch, and the surface flow efficiency was also increased. Gravel mulch covers are generally used successfully in urban landscaping and landscaping, providing visual beauty (Figure 4). It is a useful application for preventing evaporation and saving water.



Figure 4. Stone Terrace Mulch Cover and Gravel Mulch Used in Landscaping

Stone and gravel mulch covers can be used successfully for fruit trees and ornamental plants in arid areas with insufficient rainfall. It has been reported by many studies that stone mulch covers provide soil erosion control. [19], in the study they carried out in the North Yatenga Region of Burkina Faso, in arable land, in wooded areas leveled with stone banks, in order to preserve rainwater in the soil, the highest soil moisture storage was obtained from the application of a 20% sloped stone bank. has been done. As a result of the same application; tree height increased by 70%. The amount of product increased from 1.69 tons/ha to 6.39 tons/ha. Subjects covered

with mulch produced the best results compared to the control subject. The use of a one-inch layer in stone mulch covers using pebbles, pebbles, crushed stones provides great success in controlling weeds [20]. Stone mulch covers are successfully applicable and inexpensive materials for water and soil erosion control on sloping lands. Since the flowing water and the sediments carried by the water can stop between the stones, they provide good erosion control in areas with bare surfaces [21-22]. [23], in laboratory conditions, compared the straw mulch, PVA and stone cover applied on the erosion plots placed on 9% slope for erosion control, and it was determined that the stone cover mulch was more successful in erosion control.

1.3 Straw – Straw Mulch Covers

Grain straw and straw or stubble mulch covers are used in fields, vegetable gardens, orchards, greenhouses and under trees. As they rot, they mix with the soil and their disintegration occurs in a short time. They improve the physical structure of the soil. Straw mulch covers prevent evaporation from the soil surface by storing natural rainwater, especially in dry agricultural areas (Figure 5.). Since organic materials are used in this mulch cover application, they rot over time and need to be renewed. Mulch covers consisting of straw straw are a successful mulch cover for weed control, soil moisture retention and erosion control. This mulch cover also increases the microorganism activity by maintaining the soil temperature. It protects the plant from extreme heat and cold.



Figure 5. Straw-Straw Mulch Covers

[24], reported that stubble and straw covers had insufficient nutrient content. [25], used storm water conservation and mulching techniques in corn cultivation in the semi-arid and loess plateaus of China. With the plastic mulch, sand-gravel mulch and straw mulch used, higher yields were obtained compared to the control issue. Especially since evaporation is minimized with mulch covers, irrigation water is saved. As a result of the study, it was reported that the use of these mulch covers should be evaluated economically for the producers while starting the application. [26], Straw mulch was used in potato cultivation, it was determined that weeds decreased and aphid damage in potato plant decreased. It has been reported that straw mulch reduces virus formation in organic seed potato cultivation, it is not very effective on yield, and in the rain simulation applied in areas with 8% slope, it has been reported to reduce erosion by 97% compared to areas without mulch cover, [27].

1.4 Tree Bark, Plant Waste Mulch

Wood shavings are usefully used as a mulch cover in crop production and landscaping. It takes a long time to decompose, and in some cases, it can increase fungal activity. Dry leaves, bark, ground dry pruning residues are also covers that take a long time to decay, they can be used at the bottom of perennial plants. [28], the effects of different natural and synthetic mulching materials on weed control were investigated. As natural mulch, Palm Empty Fruit Bunches, synthetic canopy and polyethylenes were used as synthetic mulch cover and compared with the control issue. All mulch applications provided weed control and reduced labor costs compared to control. The mulch cover made of palm fruit bunches provided good weed control, prevented environmental pollution as it is a natural waste material and was successful.



Figure 6. Tree Bark, Plant Wastes Mulch (<https://peyzax.com/malc-nedir-malclama>)

With tree bark mulch, the soil moisture content is maintained for a long time. It is used in landscaping as a natural vegetation because its visual is beautiful. Tree bark can be used as a mulch cover in gardens and parks in all seasons. Sawdust, leaves, bark and pruning waste act as mulch under natural conditions [29]. [30], dry leaves are available from native forest areas and are used as mulch cover and have been reported to enrich the soil with nutrients as they rot at the surface.

1.5 Paper, Cardboard and Newspaper Mulch

This type of mulch, like other covers, preserves the soil water, meets the water need of the main product and provides weed control. They are applied by laying on the soil surface at a determined thickness and can be renewed as they rot (Figure 7). Newspaper mulch cover controls weeds in its use; It reduces labor costs, saves time in crop production and is biodegradable over time, beneficially used in vegetable gardens [31-32]. [33], in their water harvesting studies on jujuba trees under arid conditions in India; They covered the surfaces of the micro-basin with different waste materials such as marble pieces, stone and paper. As a result of the two-year study, the effects of these practices on the cultivation of jujuba trees were found to be significant. Covered micro-catchments retained higher soil moisture than the control subject. The plant height of the subjects covered with stone and marble pieces was 40-48% higher than the control subjects.



Figure 7. Paper and Cardboard Mulch (<https://www.growveg.co.uk/using-mulch/>) (<http://evanandkatelyn.com-cardboard-mulching>)

1.6 Surface Coating Processes

Covering by making the surface impermeable in arid areas is also a kind of covering process. By preventing evaporation from the surface, they are used to direct the rain falling in arid regions to the plant. Such applications

provide water and soil erosion control at the soil surface (Figure 8.). Paraffin application to the surface of the micro-basin to retain rainwater in the soil and provide adequate runoff. It is an application made in ICARDA (International Center for Agricultural Research in the Dry Areas).



Figure 8. Paraffin Application Providing Impermeability on the Soil Surface

It is formed by surrounding the lozenge-shaped parcels (negarim-type microcatchments) created to collect rainwater with earthen banks. Plants are planted in the lower part of these micro-catchments in the direction of slope (Figure 8). In light textured soils with high permeability, surface hardening paraffin and similar applications are applied around the trees to keep the rain water in the plant root zone. This application is used in arid areas where the slope is 1–5% and the annual precipitation is around 100–400 mm. The main purpose here is to combat drought by increasing plant production, and to rehabilitate abandoned and poorly productive areas.

However, these local water conservation practices have been reported to have been successful at low cost and have been accepted by local farmers and agronomists [34].

1.7 Surface Compaction Operations

It is necessary to collect the limited amount of precipitation falling in areas with insufficient precipitation and to preserve it in the soil profile. In the Negarim microcatchment technique, the surface compaction application parcel prepared to deliver rain water to the plant root zone and to maintain soil moisture is given (Figure 9.). [35], conducted low-cost micro-catchment applications under economic conditions in the semi-arid regions of Southwest China, in areas with volcanic soils. The efficiency of precipitation-runoff efficiency was determined under natural precipitation conditions on the compacted soil surface. In the study, the surface compacted basins; It was prepared from a mixture of fine sand, laterite and loess in 1:1:1 ratios in a uniform manner. While the runoff efficiency of the total rain was 33% in the compacted plots, it was 8.7% in the untreated control plots. Compacted surfaces have a low infiltration rate and show great potential for rainwater transmission. However, in areas where soil erosion is seen as a problem, it has been reported that the application of surface compaction for erosion control is not very successful. It has been observed that the compressed surfaces are deteriorated and transported by erosion in heavy rains. Contour ridges are levees built in sloping and arid areas. The part above the ridges is vegetative production, the rest is mostly by surface compaction or supported by mulch covers, accumulating rainwater and directing it to the planted area.

With this process, while soil moisture is maintained, agricultural production is supported at the same time. [36], investigated the effects of rainwater harvesting in ridges and furrows on runoff efficiency and potato yield in the arid region of China. Soil moisture was provided in the potato production area by applying surface compaction on the ridges, plastic mulch cover and flat sowing. The average runoff efficiency was 91-94.3% for plastic film covered ridges and 24.6-28.8% for compressed ridges. Tuber yield in plastic ridges increased by 158-176% compared to control, while potato yield increased by 14.9%-28.4 percent with surface compaction application compared to control. With the application of plastic mulch cover and surface compaction, soil moisture retention was significantly higher than the control.

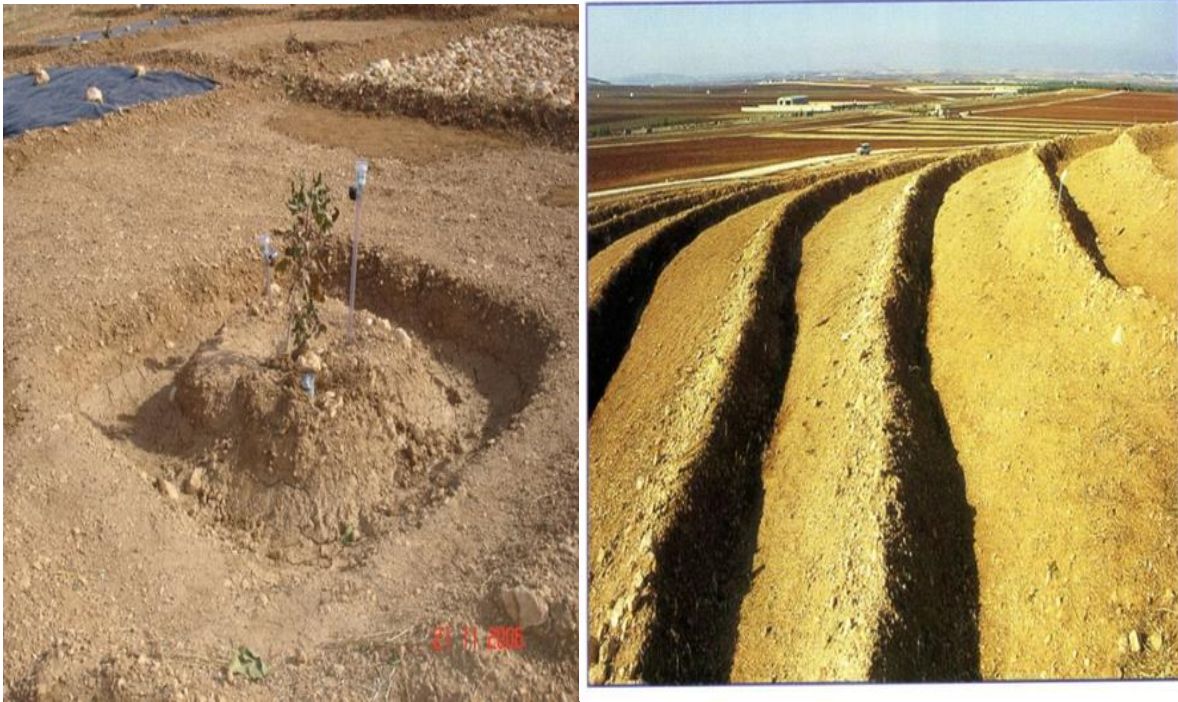


Figure 9. Soil Surface Compaction and Contoured Ridges

With surface compaction applications, soil moisture is maintained while weed control is also ensured. [37], compared three different practices for soil water conservation in agricultural holdings located in arid regions of Syria. Plots with plastic cover and surface compaction applications retained soil water more successfully than plots without mulch cover and without surface compaction. [38], climate characteristics are the most important determinant of the products to be grown in a region. Lack of precipitation and drought cause low productivity in areas where irrigation is not available and cause economic damage. For this reason, the controlled and recyclable use of water should be supported by training our farmers on practices such as the reuse of wastewater, directing producers to modern irrigation techniques, and the use of rain water that saves water [39]. [21], compared traditional practice (control), plastic mulch, stone mulch, straw-straw mulch covers and surface compaction applications for pistachio trees under dry conditions in order to collect rainwater, accumulate it in the soil and provide erosion control. In this study, water conservation and yield success were plastic mulch, straw-straw mulch, surface compaction, stone mulch and conventional application, respectively.

Plastic mulch and stone mulch cover have been successful in erosion control. In this garden, which has a 6% slope, the sediments carried by the surface flow were stopped by hitting the stones in the stone mulch application. Stone mulch, which was found to be very successful in erosion control, was determined as the most economical mulch cover. While weed control was achieved well in plastic mulch, straw-straw mulch and surface compaction applications, weed problems were experienced in the parcels covered with stone mulch. The mulch covers in this study, in which the advantages and disadvantages of each of the mulch covers were determined, were found to be more successful than the traditional application in all aspects.

RESULT AND DISCUSSION

Mulching applications are used successfully in the production of fruit trees, vegetable gardens, field crops and ornamental plants, and in landscaping. Mulch covers can be very diverse according to the purpose of use. In addition to this variety, the use of mulch covers has advantages and disadvantages. It is important to be able to choose the material to be used in a suitable and useful type and to benefit from it by applying it in a healthy way.

Mulch materials retain soil moisture, reduce evaporation from the surface, and reduce the need for water for plants grown in dry conditions. Thus, they provide economic benefits by reducing water costs. They also save soil tillage and time. In sloping lands, they help prevent erosion by reducing the intensity of rain as they cover the soil surface. Mulch covers trap the sun's rays, warm the soil, maintain the soil temperature and enable the plant to grow and develop early. They help plants develop a better root system. By preventing the emergence of weeds, they increase the yield of the main product, reduce labor and weed spraying costs, and support the producers economically. They can also reduce the risk of the formation of some soil-borne diseases and in some cases, the risk of pests. Organic mulches can decompose in the soil and increase the microorganism activity and organic matter in the soil. These mulch covers are not long-lasting and need to be renewed over time as they rot. They lower the soil pH, add nutrients to the soil and do not stay on the soil surface for a long time. The decrease in soil pH with organic mulches can affect soil fertility in some cases and cause a decrease in yield. Inorganic mulch covers can be used efficiently for a longer period of time, but application of these covers on large lands requires special equipment and expertise. Inorganic mulch covers are long-lasting, but economically costly. It is known to have many benefits such as protecting the soil from erosion and preventing weed growth. Mulch covers are of great importance in agricultural production applications. There are various advantages and disadvantages on the soil and the product grown. For all these reasons, producers should determine and apply the most suitable mulch material, taking into account the land conditions, soil structure, climatic conditions of the region and the type of product to be grown.

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