Effect of Seed Cover Types on Germination and Growth of Lawn Grass Seeds

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ABSTRACT

This experiment was carried out in the educational field of the Department of Horticulture - College of Agricultural Engineering Sciences, University of Sulaimani, (35° 32' N, 45° 21' E, and 733m altitude from sea level), the period 15th October 2019 to 15th February 2020, to study the effects of different germination covers such as polyethylene film (clear plastic), burlap (jute fabric), 3 L peat moss, 50gm hydrogel and agriculture soil on germination and growth of lawn grass seeds, it was used lawn mixtures of four seeds grass (cold season grasses). The experiment was laid out in a factorial Randomized Complete Block Design (RCBD) with three replications .

The study results showed that a high significant superiority of the treatment of covering seeds with polyethylene film in many of the studied characteristics, Including the number of days required for germination 4 days compared to 8 days for control , plant density 165.667 / 100cm2 plants whereas the control was 86.000 plants, plant height 7.267 cm whereas the shortest plants 3.33 cm achieved with soil (control), also total chlorophyll , plant fresh and dry weight, roots fresh and dry weight.

Key words: Lawn seed covers, Polyethylene film (Clear plastic), Burlap (Jute fabric), Peat moss, Hydrogel

Introduction :

Lawns are smooth, living carpets that add beauty and recreation to the location. It is an area of aesthetic and recreational land planted with grasses (Herbet, 1993). For many centuries people have been willing to devote time and resources to enhance their quality-of-life and recreational opportunities through the use of turf grasses. Also, for many centuries lawns have played a vital role in protecting our environment, long ago it became an issue of major national and international importance to modern societies (Beard and Green, 1994 .(

Lawns are considered as an essential component of private gardens, public landscapes and parks in different parts of the world. Lawn is the best foreground to enjoy the charm and beauty of the ornamental plants and features. They are developed for aesthetic pleasure, as well as for sports or other outdoor recreational purpose (De, 2017). Green spaces covered 70-80% of the land area in the public and private gardens, parks, roads, squares or sports stadiums (Sharbazhery and Gareeb, 2014.(

There are some principal environmental factors that affect turf establishment are

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temperature, moisture, light, and wind (Watschke and Schmidt, 1992). Temperature plays a major role in determining the periodicity of seed germination and the distribution of species (Guan et al., 2009). An even distribution of grass seedlings can be difficult to accomplish when establishing turf. Lightly incorporating turfgrass seed into the surface of a tilled soil continues to be the standard establishment method because soil moderates temperatures, stabilizes and enhances moisture conditions for germination, and decreases seed injury due to drying (Hensler et al., 1996.(

Factors that improve grass seed germination such as the seeds get direct contact with the soil to; absorb moisture, mulching can help retain moisture, a very thin layer, 1/8" to ¼" is all that is required, in addition to environmental factors such as temperature, light, pH, and soil moisture are known to affect seed germination (Shaban, 2013 .(

Covers and blankets are often used to protect turf during winter and spring, to warm the soil and increase germination rates, and also to reduce erosion. Seed germination blankets allow light penetration and gas exchange, facilitate soil warming, and increase soil moisture-holding capacity, all of which increase germination rates without the risk of excessive temperature buildup. It is known that germination of warm-season turf grasses increases as temperatures rise, with maximum germination rate occurring between 86 and 95°F (Patton et al., 2008). The use of a seed cover material provides the small-scale farmer with a technique that may improve germination; however, studies on the use of cover materials other than the substrate itself to increase germination are limited. Materials with unique properties, such as composts or vermicompost, coconut coir and vermiculite, need to be evaluated for cover materials in organic transplant production (Taylor et al., 2012). While mulching is not essential for lawn establishment, it will help in preventing erosion on sloped sites. Grass seed will germinate if left on top of soil. The seeds will need sunlight, oxygen, moisture and the correct temperature to grow, as long as there's also soil that it can absorb the appropriate nutrients and moisture from. However, this is hardly an ideal state for grass seeds (Patton and Boyd, 2007). After sow the seed, what's the best way to cover it up to protect it from birds and other hungry wildlife is a clear plastic coverings are one of several effective methods. In addition the percentage of germination of zoysiagrass seed could be doubled by covering seeds with a polyethylene film, which is a large sheet of plastic that you lay over planted areas and hold in place with stakes or large rocks. While if you prefer to toss your new seeds in with soil alone, you can cover grass seed with polythene and polyvinyl film. It can be the ideal alternative to straw, compost, mulch and other soil additives. Opt to cover grass seed with clear plastic instead of black or another dark color so the soil does not become too warm. The temperature beneath the sheet shouldn't reach above 100 degrees, so you may need to lift the film during the most temperate parts of the days (Patton et al. 2010.(

More than eighty years ago, until now it has been practiced the burlap to cover the lawn seeds due to its many benefits in advantages have been found to recommend the use of burlap as a protective covering for freshly seeded lawns. The benefit from protecting a terrace from the heavy rain washing deep gullies in a newly seeded lawn and carrying away good seed and topsoil.

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Another advantage of the use of burlap is that it makes seeding safe r in late spring or in summer. This applies to both flat and sloping areas. The covering reduces evaporation from the soil and also holds re-serve moisture, both of which promote quicker and more complete germination as well as more rapid seedling growth. While burlap does not remove the necessity of watering, it does reduce the frequency with which sprinkling must be done. There is less danger of the young grass dying of thirst than when a hot-weather seeding is not given such protection. Another important feature of the burlap covering is that it greatly reduces the growth of weeds. The weed seeds in the soil may germinate but their broad leaves cannot penetrate the burlap. Most of them eventually die for want of light and air while the grass continues to grow right through the burlap (Hill, 2023.(

In recent years, the invention of a quick way to grow the seeds of the lawn grasses in steep slopes, which is called hydroseeding, the main ingredient in which to cover the seeds are hydrogel, which are polymers. Plant gel or hydrogel is 100% non-Toxic, biodegradable, and odorless super absorbent crystal that absorbs water up to 400 times its weight and has a life span of approximately 5 to 7 years. It is an excellent growing medium for plants due to its water absorbing ability. This media allows the availability of 90% of the water and nutrients to the plant's root system. (Trippei et al. 1991) (Aveni et al., 2002). This innovative method is known to be easy, cheap and ecological. It lets to decrease costs of irrigation and humans work, enables to safe water and energy with holding the chemical safety for the environment (Hadam et al., 2011.(

Peat moss is also used to covering lawn grass seeds, its organic matter that improves the germination rate of grass seed when you incorporate it into your soil. The structure of peat moss adds aeration to the soil, allowing good airflow for seed germination, where peat moss will not only protect the seeds from being washed or carried away, but it also helps to prevent the seeds from drying out and adds beneficial nutrients to the soil, among the other benefits of peat moss including absorbency, compaction prevention, a sterile planting medium, and its acidic pH (Mofidpoor, 2007 .(

In light of above facts, the objective of this study is to investigate how different seed covers influence the germination and growth of evergreen lawn grass seed mixture.

Materials and Methods:

This experiment was carried out in the educational field of the Department of Horticulture - College of College of Agricultural Engineering Sciences, University of Sulaimani, (35° 32' N, 45° 21' E, and 733m altitude from sea level), for the period 15th October 2019 to 15th February 2020. It was used lawn mixtures of four seeds grass (cold season grasses), obtained from the Barnabrog lawn seed company consisting Lolium pernne Green fair 20%, Festuca arundinacea Stariett 35%, Poa pratensis Panduro 35%, Poa pratensis 10%. Initially, the experimental site was divided into five blocks, and each block was divided into three experimental units, each experimental unit consisted of 1 x 1 m area, the planting medium consists of a mixture of agricultural soil with a depth of 25 cm. The soils of experimental field were analyzed to obtain some physical properties table (1 .(

After settling the cultivation medium inside the experimental units, it was irrigated with water until saturation and obtaining the

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field capacity of the medium, after a day the lawn seeds were sown in units at a rate of (50 g/ plot). After sowing, the plots were covered with different germination covers (polyethylene film (clear plastic), burlap (jute fabric), 3 L peat moss, 50gm hydrogel and agriculture soil). The plots were irrigated as needed to maintain seedbeds moist, and after growth of the lawn the covers were removed .

Table 1: Some physical properties of the soil:

Clay	Silt	Sand	Textural name	Bulk density	Available water%	O.M.C
577.82	378.38	43.80	salty clay	1.2	11.43	25.27

Table (2): Average of maximum and minimum temperature, and during the period of Oct.2019 to Feb. 2020 for the experiment location:

Month-Year	Air Temp. ˚C		Relative Humidity %
	Max.	Min.	
October - 2019	31.2	16.3	21.0
November - 2019	26.1	13.3	47.1
December - 2019	19.5	9.40	48.5
January - 2020			
February - 2020			

Data measurements began from the third day, until the end of the experiment (15th February 2020), including the following experimental data:

-1Number of days to germination: The average number of days required for the germination of 50% of the seeds in the area of the experimental units was calculated.

-2Plant Density: Plant density calculate by making square from metal silk it area 100cm2, then randomly throw on the flat to calculate plant number that located in that area of 100cm2 (Jordon ,2003.(

-3Plant height (cm): The height of the nest plants was measured from the soil level to the end of the leaves

-4Total Chlorophyll (mg/100 gm fresh weight): The Total chlorophyll has been measured by special digital device (Chlorophyll meter, SPAD-502, Konica Minolta.(

-5Root length (cm): Calculated by the Measuring the depth of the tape root.

-6Plant fresh weight and roots fresh weight (gm): Plants were uprooted in soil and washed

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with water after drying for taking required measurements.

-7Plant dry weight and roots dry weight (gm): Plants were uprooted in soil and washed with water, dry weight was measured after drying the vegetative and roots part in the oven at a temperature of 70OC for 48 hours, after drying for taking required measurements.

The field experiment was laid out in a factorial Randomized Complete Block Design (RCBD) with three replications. The comparison between means was carried out according to Duncan's multiple range test (P< 0.05) using the computer program XLSTAT .

Results and discussion :

-1Number of days to germination: The results of the analysis in table 3 indicate a significant superiority of the clear plastic covering treatment over the other treatments, and the number of days required for germination was only 4 compared to the comparison treatment 8 days 9 (control), which is field soil, then comes then comes the coverage with moss in the second rank, which is 6 days, then the burlap 7 days, and the fourth rank is field soil(8 days), and the gel comes in the fifth rank, which is 9 days.

In general grass seed can take from five to 30 days to germinate depending on variety and soil temperature. The warmer the soil, the more quickly the seed sprouts. Seed must be kept consistently moist until it sprouts or it won't germinate.

The reason for the superiority of clear plastic coverage in reducing the number of days needed for germination may be due to the plastic cover helping retain moisture near the seed during germination. Mulch speeds germination and improves stand uniformity. It is particularly useful on areas exposed to wind and prone to rapid drying. It also is useful in preventing surface erosion. It can even prevent earthworms from moving seed around in the course of their nightly wanderings (Cook, 2004.(

Also the reason for the superiority of covering with peat moss in reducing the number of days required for germination in the second rank, the reason may be due to the dark-colored of peat moss greatly enhance emergence in late fall. This effect might be due to the fact that the dark mulch absorbs sunlight and raises the soil temperature (Mofidpoor, 2007.(

While the burlap cover ranks third, laying burlap on top of the newly seeded lawn and using it as a grass seed blanket is one way of protecting the seeds. Summer’s scorching sun is also a danger to newly germinating seeds. A covering of burlap protects them from the heat. It also provides a defense against weeds, and using a few layers of burlap covered with wood chips increases the protection. A loose-weave burlap also allows the germinating seeds to grow through the fibers, but the looser the weave, the more weeds can come through, In the event that the burlap remains it leads to being dissolved into the soil will enhance it (Reg and Pat, 1938 ; Kometar, 2021 .(

-2Plant Density: The results of table 3 show a significant superiority of the nylon covering treatment in plant density over the rest of the treatments, so that the density reached 165.667 plant/100cm2 compared to the comparison treatment (86.000), whereas the lowest value (69.333) were achieved with hydrogel. There were no significant differences in the other different covers of the lawn.

The reason for this may be due to the role of the nylon covering in keeping moisture near the seeds, it also is useful in preventing soil surface erosion and collecting seeds in cracks. Also it helps in absorbing the sun light, and

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this leads to heating the air under the cover and the soil and creating a suitable environment, which encourages the germination of more seeds, as well as more rapid seedling growth, in the end the plant density increases (Cook, 2004 ; Patton et al. 2010 .(

-3 Plant height (cm): The results clearly indicated that the highest plants (7.267 cm) was obtained at polyethylene cover which was significantly superior on the other covers of the lawn, but the lowest value (3.333 cm) was recorded for peat moss and the control, respectively, in the same case jute fabric gave the second best long plants significantly compered to control, peat moss and hydrogel covers. The height of the nest plants was measured from the soil level to the end of the leaves.

Perhaps the reason for the increase in plant height by covering with nylon is to create the conditions for germination, which leads to early germination in less time and this encourages the plant to overgrowth.

-4Total Chlorophyll (mg/100 gm fresh weight): Also, the data of Table 3 indicates a significant superiority of the nylon covering treatment over the rest of the other four treatments in increasing the concentration of total chlorophyll pigment. The reason for this may be due to the many benefits of covering the seeds with nylon, which leads to early growth and improvement of growth, and this leads to an increase in the green pigment in the plant..

-5Root length (cm): the results showed that length of the roots were not statistically different among control plants and plants germinated and grown under the different covers. The reason why the depth of the roots was not affected by the different seed coverage treatments may be due to the genetic factors related to the depth of the roots and the agricultural medium, as some treatments affected the increase in the size and weight of the root mass.

-6Plant fresh and dry weight, Roots fresh and dry weight (gm): We notice from table 4 a significant superiority of the nylon covering treatment over the rest of the treatments in both the fresh and dry weight of a plant, as well as the fresh and dry weight of the roots.

The reason for the increase in the size and weight of the plant mass from the fresh and dry weight of the vegetative and root growth in the Nylon mulching treatment may be due to the same reasons that were mentioned in the interpretation of the benefits and effects of Nylon mulching, which led to the delay and encouragement of germination and growth and an increase in the size of the plant and as a result led to an increase in the fresh and dry weight.

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Table 3: Effect of some different Lawn covers on some characteristics the lawn grasses:

Lawn Covers	No. of days to germination	Plant Density (plant/100cm^2)	Plant Length (cm)	Total Chlorophyll (mg/100 gm w.t)	Root length (cm)
Polyethylene	4 a	165.667 a	7.267 a	3.2 a	6.333 a
Jute fabric (Burlap)	7 ab	122.000 ab	5.500 b	1.85 b	6.533 a
Peat moss	6 b	130.000 ab	4.600 c	1.4 b	7.267 a
Hydrogel	9 c	69.333 b	3.333 d	1.2 b	7.833 a
Soil (Control)	8 bc	86.000 b	3.333 d	1.3 b	6.033 a

Table 4: Effect of some different Lawn covers on some characteristics lawn grass growth:

Lawn Covers	Plant fresh weight (gm)	Plant dry weight (gm)	Root fresh weight (gm)	Root dry weight (gm)
Polyethylene	1.21 a	0.60 a	1.483 a	0.276 a
Jute fabric	0.20 b	0.13 b	0.527 b	0.120 b
Hydrogel	0.69 b	0.28 b	1.710 a	0.163 b
Peat moss	0.18 b	0.11 b	0.500 b	0.083 b
Soil (Control)	0.46 b	0.12 b	0.237 b	0.059 b

- Depending on the results of the study conclude the following: We conclude through these treatments the response of the evergreen seed mixture of Barnabrog lawn seed company to the different covering materials, and the treatment most affected is the coverage with nylon in the first place, then peat moss in the second place and burlap in the third place in many of the traits that were studied during the period of the experiment

- Based on the results and conclusions of the study, we recommend using nylon or peat moss to accelerate germination and mitigate the effects of cold during the cold seasons of late fall, winter and even early spring. We also recommend using burlap when planting seeds during hot seasons to reduce the effects of heat on germination of seeds in mid-spring to mid-autumn. Also we recommend more studies on the use of other materials to cover seeds and other types of lawn grass seeds.

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Fig. 1: Soil prepare in the experimental units and flooding it water

Fig. 2: Leveling the soil and preparing it for planting seeds

Fig. 3: Covering the seeds with different experimental materials

Fig.4: Germination of seeds in different treatments

Fig. 5: Grown lawn in a plastic covering treatment

Fig. 6: Grown lawn in a burlap **covering treatment**

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