Effects of Seed Coating Methods on Germination of *Medicago sativa* in Different Moisture Stress Levels and Sowing Depths

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ABSTRACT

This research was performed in order to expand different scientific dimensions of seed coating as a new method, increase the quickness and percentage of budding, and consequently contribute to the initial continuation of Medicago sativa species in dry situation and different depths of planting. This plan was carried out as a factorial test in the form of completely coincidental pattern with three replications. Soil moisture percentage (dryness) in three levels of 9%, 14%, 21%, dried soil weight, planting depths in two levels of seed thickness and planting at surface and substance coverage in four observation levels without covering (NC), substance with organic base (OC), substance with Hydrogel base (HC), and substance with mineral base (CC) have been applied during the test. The factor of germination percentage was tested and measured. The triple interaction effects of soil moisture, sowing depths and coating materials indicated that germination percentage in all coating materials regardless of coating type in 14% and 21% soil moisture levels and surface sowing depth were more than testator treatment without cover (NC) in 9% moisture. According to the results, there was no germination in this level. In terms of sowing depth of three times, the seed diameter and 21% soil moisture, there was no significant difference in germination percentage between testator and coating treatments, but the most recent germination was seen in testator treatment with surface field and 21% moisture. It was almost constant in the other treatment in three times the seed diameter. Results showed that seed coating is important to germination seed in dry weather and it can promote percent of germination significantly based on treatment.

KEYWORDS: *Seed coating, Soil moisture, Sowing depth, Germination percentage*

INTRODUCTION

More than half of Iran's area is composed of pastures. Preserving, surviving and development of Iran do not only guarantee and support valuable animal living and biodiversity, in Iran but also have an impact on the independence preserve of country and human profits.

Pasture is one of the main resources that have worthwhile functions in breeding the animals, especially since the increase in population leads to the use of pastures more than usual for obtaining more animal production. Pasture is considered as a part of renewable resources, but the renovation of natural living is not simply done while there is a demolition. In doing so, it is obvious to take advantage of correct necessity and awareness guard of pasture, that is the science of range seeding[1] and pasture capacity. According to the expanded levels of country pasture, poor pasture necessity should attract more and more attention because the country needs the animal products. One of the pasture surviving methods is to enter suitable grass species into the pasture by seed sowing. This method makes the importance of seeding projects clear.

Every year, seeding projects in the country are allotted plenty of time and money. Several measures are done in order to enhance the achievements of seeding projects, such as seed coating. Using seed coating is one of these methods that put away the seeds using the environment shortages to take profit of them if necessary.

The seed coating method is performed to achieve various purposes. It can be noted that providing necessary materials for seeds, supporting them against the birds and rodent attacks, doing the easy seeding by plane and preventing the environmental stresses which affect the seeds[3]. Considering the effects of moisture absorption of Supper sharper on multispecies germination, the obtained results indicate that the effects of moisture absorption of materials have not had meaningful differences with non-coating treatment. Also, tape coverage and tape connection treatments and the material moisture absorption have negative impacts on germination.

Scotte[10] studied the seed coating effects and reported that seed coating influences the plant settlement and in some cases, it causes the postponing of germination. Yamachi & Chong[9] stated in their test results that when the rice seeds were covered with peroxide calcium then compared with the seeds without peroxide calcium coverage, they found out that the seeds with no coverage had more resistance and longer life. In one level of soil and in the same depth, approximately 13cm under the soil surface, Mehrabi[4] showed in his study that seed coating reduces the pasture germination of sanguisorba in dryness tension and different sowing depths. Three kinds of coating material at 1% significance level with materials in generic, hydro gel and mineral bases regardless of coverage kind were measured in wetness treatment.

As range seeding project is done in high expanding levels, it is impossible to investigate time and expenses like seed planting in a garden or farm level. Accordingly, there is a need to improve the seed sowing achievement in pasture. In this research, the purpose is to develop different scientific aspects of seed coating in the country. It is a new method to increase the speed and germination percentage and as a result, help in the primary settlement increase of *Medicago sativa* in dryness tension conditions and different sowing depths.

MATERIALS AND METHODS

This research was been done for seed coating of *Medicago sativa* species and the studies were performed in two parts of lab and growth room. Today, the *Medicago sativa* species is the most significance grass plant in agriculture that has such features as expanded environment compatibility, and high grass production with excellent quality. *Medicago sativa* used as dry grass plays an important role in supplying animal food, improving and surviving in cold region pastures, and changing high slope irritated place and low yield. Significant attention was given to seed coating effects on germination percentages in this research.

Seed samples were prepared randomly from the packed bags of available *Medicago sativa* plants in a seed production center located in Isfahan province (PakanSeed). After carrying the seeds to the agriculture research lab and natural cultivation resource in the industry city of Borujerd, separation of unused materials was done. Seed purifying test, weight determination of thousand seeds in gram and germination ability test were done on the basis of ISTA in guild line[2].

Growth room is similar to the environment of green house with natural growth place conditions and the soil located near the cultivation pasture because of cultivation bed under a horizon. In order to decrease the operation error, soil homogenization was performed by sieving and spreading it in fresh air until it became dry. Next, in equal degree of soil spoor in flower pot for preventing the labeling of flower pot, this plan was performed in a factorial experiment in a completely randomized model with three treatments and four replications. The following treatments were used in the research: treatment of soil moisture percentage (dryness tension) in three levels of 9, 14 and 21 percent of dry soil weight, treatment of sowing depth in two levels of triplicate seed diameter and cultivation and coating material treatment in four levels of witness without coverage (NC), materials with organic base (OC), Hydro gel base (HC) and mineral base (CC). In each flower pot (experimental unit), five *Medicago sativa* were cultiva-ted with same distances from each other. During the experiment, germination percentage was measured. Obtained results were analyzed using SPSS and SAS software and means comparison performed using the Duncan multi-scope test.

RESULTS

Obtained results from variance analyses showed that among the main effects of treatments, soil moisture percentage and sowing depth influence the germination percentage of *Mediago sativa* in one hundredth. Between seed coating and germination percentage, no relationship was seen.

Considering the interaction effects of soil moisture percentage treatment, kind of seed coating, interaction of sowing depth treatment and kind of seed coverage, the relationship of soil moisture percentage treatment, sowing depth and also with regard to triplicate impact of soil moisture percentage, sowing depth and kind of seed coverage, it was found out that no meaningful relationship exists between them and germination percentage of *Medicago sativa* (Table 1).

Table 1. Variance analysis and effects of moisture percentage, sowing depth and seed coverage on germination percentage of *Medicago sativa*

Change Reference	freedom degree	Square average
Moisture	2	5794.792
Depth	1	1504.167
Seed coverage	3	300 ns
Moisture depth	2	76.042 ns
Moisture seed coverage	6	453.125 ns
Depth a seed coverage	3	159.722
Moisture a depth a coverage seed	6	48.264
Changes coefficient (cv)	13.44	

The mean comparison of main treatment effects shows that the relationship of soil moisture percentage treatment and germination percentage is meaningful. Germination percentage followed an addictive trend with the increase of soil moisture degree. In 9% and 21% moisture degrees, the least (25/63%) and highest germinations (79/38%) were observed. Seed coating treatments with mineral (cc), hydro gel (HC) and organic bases (OC) have no meaningful differences with themselves and wetness (NC) (Table2).

Table 2. Mean comparison of main treatment effects on germination percentage of *Medicago sativa* using Duncan's multi scopes test

Treatment	Dry soil weight	Germination percentage
Moisture	9%	25/63c
	14%	50b
	21%	79/38 a
Sowing depth	Surface	43/75 b
	Triplicate seed diameter	59/58 a
Seed coverage	NC	51/67b
	OC	46/67b
	HC	46/67b
	CC	61/67a

Obtained results on the interaction effects of seed coating material and moisture percentage of soil displayed the highest germination percentage in all seed coating treatments in 21% moisture level from 82 to 92%. At this point, among three covering materials, no meaningful differences were seen. The smallest germination percentage was obtained in wetness treatment without coverage and 9% and 5% moisture degrees. Therefore, it has had differences with all seed coating treatments at different levels of moisture.

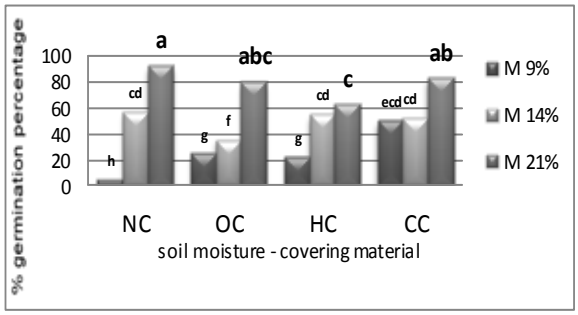

Figure 1. Effects of soil moisture percentage and covering materials on germination percentage of *Medicago sativa*

Regarding the effects of treatments, the kind of coating material determined that the highest germination percentage was obtained in all treatments at triplicate seed diameter. Among them, the material with a mineral base designated the highest degree (70%) to itself. The highest germination percentage is 31 to 66 for the material treatment with hydro gel base (HC). Meanwhile, germination percentage level did not obtain specific differences in other treatments at surface sowing level and triplicate cultivation seed diameter.

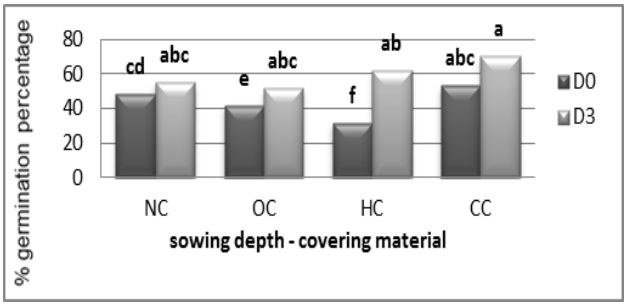

Figure 2. Effects of covering materials and sowing depths on germination percentage of *Medicago sativa*

Triplicate mutual effects of soil moisture percentage, sowing depth and coating material indicate that in 1g and 21% of moisture levels and surface sowing depth, germination percentage was more in 9 levels than wetness treatment.

Considering treatment without coverage (NC) and the kind of coverage in wetness treatment without coverage in surface cultivation, the results showed that germination has not happened in this level according to the obtained number (0).

In treatments of sowing depth in triplicate seed diameter and 21% soil moisture, meaningful differences were not observed for germination percentage between wetness and seed coating treatments, but germination percentage in wetness treatment with surface cultivation and 21% moisture was more than other treatments in this level (95%) and almost was rather equal with other treatments in sowing depth of triplicate seed diameter.

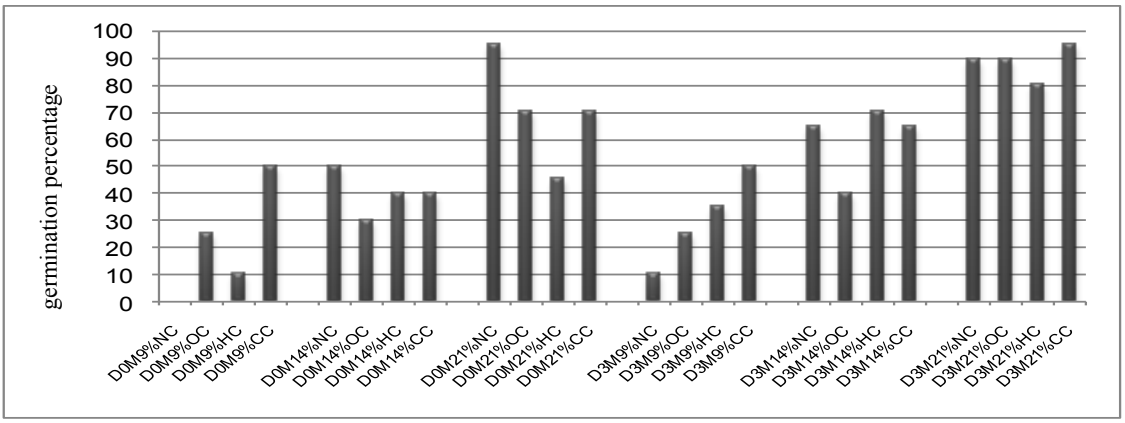

Fig.3. Effects of soil moisture percentage, sowing depth and covering material on germination percentage of *Medicago sativa*

DISCUSSION

The obtained results showed that among three considered treatments, soil moisture percentage and sowing depth had been effective at 1% level in the germination of ordinary *Medicago sativa.* No relationship exists between seed coating and germination percentage. According to graphs, coating material impact was not considerable in 9% moisture level and was not statistically meaningful.

The effects of soil moisture percentage treatments, sowing depth and covering material on plant germination of ordinary *Medicago sativa* showed that in 14% and 21% moisture levels and surface sowing depth in all seed coating treatments, germination has not practically happened in wetness treatment in surface cultivation and 9% moisture, but germination percentage in wetness treatment with surface cultivation and 21% moisture has been more than other treatments in this level and approximately equal to other triplicate seed diameter treatment in sowing depth. As a result, it can be said that the destructive element is moisture shortage. In dryness condition (surface cultivation and 9% moisture), according to triplicate effect chart, the coverage with mineral material base has the highest effect on germination percentage. Therefore, the most suitable choice is the seed coating of dry region with the combination of material with mineral base for seeding. Probably, this material has more water absorption. This is confirmed by the obtained results[10] which show that water absorption combination is suitable for the seed germination to increase in semi-dry regions rather than very hot ones.

All test cases can be referred to the results obtained by Farahpoor[3]. His results indicated that effects of moisture absorption have not had meaningful differences with treatment of coverage. Also, treatments with coverage combination tape and moisture absorption have had negative effects on germination[9]. According to their test results, they stated that when rice seed has been coated with peroxide calcium, the same kind without coverage has more resistance and longer life. According to the most important results related to triple effects, it can be said that in dryness condition (surface sowing and 9% moisture), the highest impact has been related to coverage with mineral material base for the measured moisture percentage factor. Probably, this material is able to absorb more moisture from the environment near the seed, prepare suitable conditions, and prevent drying the seed. Consequently, the combination with mineral coverage has been the most suitable choice for seed coating in seeding project in dry and semi-dry regions.

Through performing more experiments and researches, it was found out that by clay coating of grass seeds such as *Agropyron elongatum* and logom such as *Medicago sativa* and using them in pasture seeding, coating causes seed germination and settlement increase and much dryness leads to seed coating track and at least seed break and separation.

In some cases, it leads to seed drying. As a result, it can be said that the main problem is dryness and lack of moisture for germination.

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