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The effect of tetrazolium and rubbing on dormancy breaking in Beans

Safia Gul[1], Zainab Naz[1], Hameed Ur Rehman*[2]

[1]Department of Plant Sciences, Sardar Bahadur Khan Women's University, Quetta, Pakistan

[2]Department of Chemistry, Kohat University of Science & Technology, KUST, Kohat, Pakistan

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Abstract

Seed dormancy is a resting condition of plant seeds that control germination under extreme environmental conditions. True dormancy is due to conditions in the seed that prevent germination in normally ideal conditions. Tatrazolinm is a chemical which has an effect on breaking dormancy, another way of breaking the seed dormancy is a mechanical method like rubbing the seed in laboratory trial the seed of red bean, white bean, gram seed and corn showed 50, 50% results by means of treatment of tatrazolinum and after rubbing the seeds showed 0% in (corn) and (red bean) 80% in (white bean) and 90% in (gram seed). These treatments affect the seed germination.

* **Corresponding Author:** Hameed Ur Rehman ✉ 03449002451h@gmail.com

Introduction

Seed dormancy is a resting condition of plant seeds that control germinating under extreme environmental conditions. True dormancy is due to conditions in the seed that prevent germination in normally ideal conditions seed dormancy is divided into two major parts: exogenous and endogenous. There are a number of classifications developed to group different dormant seeds, Dormancy occur because of a many reasons that, producing conditions. There are a number of classifications developed to group different dormant seeds, Dormancy occur because of a many reasons that, producing conditions.

Physical dormancy occurs when seeds are impermeable to water and the exchange of gases. Legumes are examples of physically dormant seeds it has low moisture content and are prevented from imbibing water by the seed coat. Cracking of the seed coat allows water intake. Mechanical dormancy occurs when seed coats are too hard to allow the embryo to expand during germination. These endogenous facts include physiological dormancy which is caused by low embryo growth, Chemical dormancy is occur growth regulators, etc. that are present in the coverings around the embryo. They are leached out of the tissues by washing or soaking the seed, other chemicals that prevent germination are washed out of the seeds by rainwater. The important process of most seeds is delayed germination, and it allows time for dispersal and germination of all the seeds at the same time. The germination of some seeds and seedlings are damaged or death from short periods due to bad weather or from herbivores. Tetrzoilum germination is a measure of seed quality. One disadvantage of germination tests is that they want a waiting period of two weeks or more. The tetrazolium test is a quick chemical test that can give results in a short period of time with minimal equipment. In this test, a seed is incubated in a (0.1%) dilute solution of 2, 3, 5-triphenyltetrazolium chloride. Initially the tetrazolium solution is colorless, but changes to red it contact with hydrogen (reduction) from the enzymes in the respiration process. Fungal infection is responsible for seed this coloration (Mishra *et al*. 1994).

The use of tetrazolium test to monitor the effect of microwaves on maize seed viability Seed germination starts with the uptake of water by the dry seed and its ends with the elongation of the embryo axis t., however, intact imbibed seeds are metabolically active but fail to complete germination even though their environ affecting seed coat can revealed seed dormancy (Debeaujon & Koornneef, 2000). The aim of the research work was to find out the effect of tetrazolium and rubbing on dormancy breaking in Beans.

Material and methods

Mechanical Methods

Four types of seeds, red beans, white beans, corn seeds and gram seeds were selected for experimentation. Seed viability tests were carried to choose dormant seeds among these selected bean species and each set of the seed are further processed for experimentation in lab conditions.

Chemical Method

All the four types of seed e.g red bean, white bean, corn seed and gram seeds were soaked in distilled water. After two hours seeds were cut, it into two equal halves and were treated with tetrazoilum solution and left for 30 minutes. After 30 minutes the effect of tetrazoilum on different types of seeds was observed and the appearance of red color indicates the healthy seeds.

Results

The effect of tetrazolium on (red bean) (white bean) (gram seed) (corn) and seed germination at constant temperature (20 °c)

The effect of tetrazolium

° The corn seed showed tetrazolium effect 50% on third and fifth day while 60% in sixth and seventh day.

° The red bean showed 20% effect against tetrazolium in first and second day while 30% in third day and 50% & 60% in fifth and sixth day and 70% in seventh day.

° The gram seed showed 10% effect of tetrazolium in first day, 30% in second and third day, 40% in forth day, and 70% in fifth, sixth and seventh day.

º The white bean showed no effect against tetrazoliu in first day, 30% in second day, 50% in third and fourth day, 60% in fifth and sixth day and 70% in seventh day.

The initiation of germination at constant temperature (20ºc).

º The germination of corn seed started on third day under the tetrazolium effect, (50%)
º The germination of gram seed started on first day under the tetrazolium effect, (10%)
º The germination of red bean started on first day under the tetrazolium effect, (20%)
º The germination of white bean started on Scand day under the tetrazolium effect, (30%)

The final seed germination
º The final germination of corn seed was (60% ± 2.47) under tetrazolium effect.
º The final germination of gram seed was (70%± 6.41) under tetrazolium effect.
º The final germination of red bean was (70%±3.57) under the tetrazolium effect.
º The final germination of white bean (70%±2.19) under the tetrazolium effect.

The effect of rubbing with soil on (red bean) (white bean) (gram seed) (corn seed) and seed germination at constant temperature (20ºc)
The effect of rubbing with soil
º The corn seed showed rubbing with soil no germination.
º The red bean showed rubbing with soil no germination.
º The white bean showed rubbing with soil germination in first day 0%, second and third day 40%, fourth day in 50% germination, fifth day in 60% germination, sixth and seventh day in 80% germination.
º The gram seed showed rubbing with soil germination of second and third day in 40% forth day in 50% germination fifth day in 70% sixth and seventh day in 90% germination.

The initiation of germination at constant temperature (20ºc).
º The germination of corn seed started on third day under the rubbing with soil (0%).
º The germination of gram seed started on first day under the rubbing soil (90%).
º The germination of red bean started on first day under the rubbing with soil (0%).
º The germination of white bean started on Scand day under the rubbing with soil (80%).

The final germination
º The final germination of corn seed was (0% 0) under rubbing with soil effect.
º The final germination of gram seed was (90%±2.91) under rubbing with soil effect.
º The final germination of red bean was (0%±0) under the rubbing with soil effect.
º The final germination of white bean (80%±2.56) under rubbing with soil effect.

Table 1. Effect of chemical and mechanical treatments on percentage seed germination.

S.No	Seeds	Germination % with treatment of	
		Tetrazolium	Rubbing soil
1	Red bean	70%	0%
2	White bean	70%	80%
3	Gram seed	70%	90%
4	Corn	60%	0%

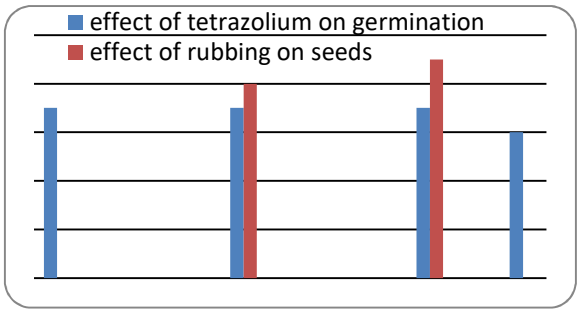


Fig. 1. Showing comparative effects of mechanical and chemical treatments for dormancy breaking.

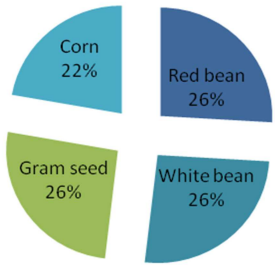


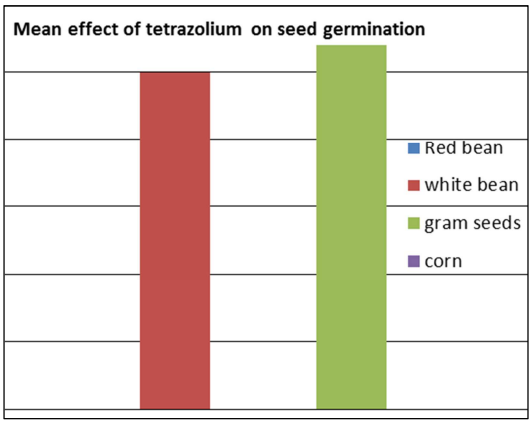
Fig. 2. Showing percentage of germination among different beans.

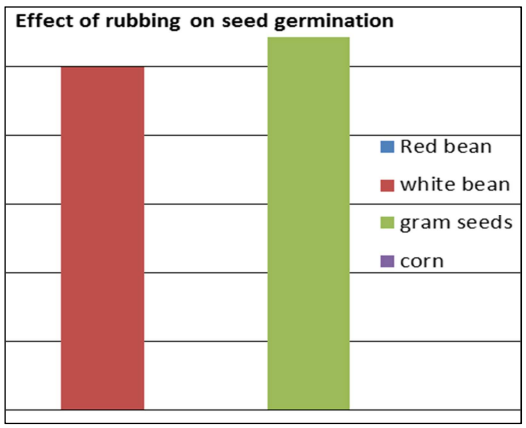
Table 2. Effect of Tatrazolium on germination.

S. No	Red bean	White bean	Gram seed	Corn	Mean Error	S.E
1	0	0	0	0	0 (45)	4.145781
2	0	40	40	0	20	6.123724
3	0	40	40	0	20	5
4	0	50	50	0	25	2.165064
5	0	60	70	0	32.5	3.535534
6	0	80	90	0	42.5	2.165064
7	0	80	90	0	35.4	3.535521
Mean	0	50	54	0		

Table 3. Showing values for rubbing effects on seeds.

S. No.	Red bean	Gram seed	Corn	White bean	M.Error	S.E
1	0	0	0	0	0	0
2	0	40	0	40	0	10.1105
3	0	40	0	40	20	10.1105
4	0	50	0	50	20	12.5
5	0	70	0	60	25	16.34587
6	0	90	0	80	32.5	21.3234
7	0	90	0	80	42.5	21.3234
Mean	0	54.28	0	50		





Discussion

Seed dormancy is arresting condition of plant seeds that control germinating under extreme environmental conditions. Dormancy occurs because of many reasons such as mechanical, physical or chemical dormancy. Rubbing with soil is the type of mechanical dormancy while use of chemical such as tatrazolium salt is the example of chemical dormancy. Hermansen *et al.* (2000) reported that H_2SO_4 was responsible for breaking of seed dormancy.

In the present study the seed dormancy was studied by two methods: By mechanical such as rubbing with soil and by chemicals such as tatrazolium salt. The order of dormancy was rubbing soil >tatrazolium salt.

Rubbing with soil showed more dormant effect as compare to tatrazolium. The dormancy due to rubbing with soil on test species such as white bean, red bean, corn and gram seed. The order of dormancy was corn= red bean> white bean> gramseed. Taiz and Zeiger (2002) reported that the inhibitory effect of the seed cote on seed germination may be caused by several possible mechanisms, inducing mechanical constraint, preventions of water and oxygen uptake and retention or production of chemical inhibitors.

Tatrazolium salt produces less dormant effect as compare to rubbing with soil .The dormancy due to tatrazolium salt on test species such as on white bean, red bean corm and gram seed was different. The order of dormancy was white bean > red bean > corn> gram seeds. Chuaren *et al.* (2004) reported that the germination of enhancer *Angustifolia* seeds was improved by GA_3 and it was suggested that GA_3 affects

physiological as well as metabolic activities of seeds, resulting in the early germination. In the same way Brits *et al.* (1995) reported that GA3 increased the germination in many plant species, including *Leycospermum*.

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