ORIGINAL RESEARCH PAPER

Botany

KEY WORDS: *Cicer arientinum* L., Storage temperature, Germination.

Effect of Storage Temperature on Seed Germination of *Cicer arientinum* L.

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ABSTRACT

Storage temperature is the most important factor which affects the seed germination. Storage of seeds to proper temperature is necessary for keeping seed moisture maintained. Our aim of the study was to evaluate the effect of different storage temperature on germination of *Cicer arientinum* L. The seeds were graded and stored into five different storage temperatures in Polythene airtight bags for 30 days. After storage period percentage of germination, length of plumule, fresh and dry weight and average of dead seeds were calculated. Results showed maximum germination at 5-7°C and minimum at 28°C.

INTRODUCTION:

Chickpea (*Cicer arietinum L.*) is one of the most extensively grown Rabi pulse crop in India. The maintenance of seed quality during storage is most important and challenging in the crop due to problem of quick loss of seed quality (Basavegovda. et. al. 2013). Storage of seed is an essential step for long-term conservation of plant genetic resources. Maintaining seed viability for longer period is very essential to preserve the genetic integrity in stored samples. (Nasreen et al 2000, Schmidt 2002). Seed characteristics decrease under long storage condition due to aging are significant term of seed quality, the feature that, among other things , also implies seed longevity (Mcdonald 1999). Progress of the technology and industrialization of agricultural production has increased opportunities for long term storage of seed. Aging condition generally reduces seed vigour (Mcdonald, 1999). The purpose of proper storage is to inhibit biological processes to the highest possible extent and to eliminate unfavorable environmental factor, which limit duration of the safe storage. The biochemical processes occurring in grain are directly influenced by moisture content, air temperature, contact with air and condition of grain (Mcdonald, 1999).

Saveral factors, namely temperature, nature of the seed, seed moisture content, and relative humidity influenced the seed longevity during storage (Bonner, 1990), slight increase in temperature and moisture may promote fungal growth (Roberts, 1990). Proper storage condition, however may effectively retain substantial viability in seed over a considerable storage period (Badola, Dardhan, 2008). Seed deterioration can be defined as the loss of quality, viability and vigour either due to the effect of adverse environmental factors .the rate of determination rapidly increase in either seed moisture content or temperature of storage (Kapoor et al, 2010).Rising of temperature, humidity and oxygen pressure could cause structural damages on DNA and ribosomal RNA increasing enzyme activity ,respiration and membrane permeability (Mcdonal,1999).

The purpose of storage is to maintain harvest quality of product, not to improve it (Sisman and Delibes 2004). The present study was undertaken with an aim to test the effect of different storage condition on seed germination in chickpea.

MATERIAL AND METHOD'S

1) Collection of seed's.

Seed of *Cicer aeritinum* L. (KAK-II) are collected from authorized dealer.

2) Storage of Seed's

Seed's of Cicer were graded and stored into five different storage temperature in polythene airtight bag for 30 days.

i. Cold storage (Temp. -5°c) (humidity 65-75%).
ii. Freezer (Temp. - 3°c) (humidity 30-35%).
iii. Refrigerator (Temp. - 13° c) (humidity 30-35%).
iv. Alternate Sunlight (28°c – 30°c) (humidity 8 – 10%).
v. Room Temperature (25° c – 26°c) (humidity 50-60%).

3) Sterilization

For each germination test, seed were at first sterilized with mercuric chloride solution (0.1 $Hgcl_2$+ 100 ml dist water). For 5 sec to reduce the incidence of fungal attack and then seed are washed with distilled water.

4) Experimental Setup

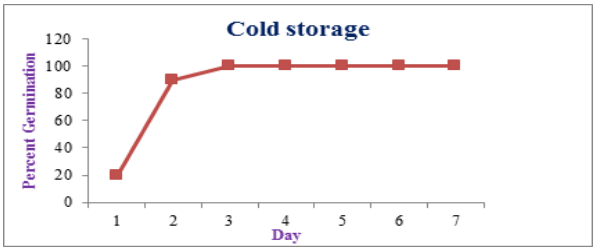
After sterilization, according to their storage temperature the set were divided into 5 type (cold storage, freezer, refrigerator, Alternate sunlight and Room Temperature) then petriplates were washed with distilled water, Then in dried petriplates a petriplate sized bloating paper were placed and 10 healthy seed in each petriplate according to its storage Temperature.

5ml of distilled water for each petriplates is added. Then all the petriplate were closed with lids and placed in incubator with temperature (26°c for approx 24 hours). After 24 hour the germination parentage and plumule length were recorded. After recording the data, 5ml of distill water is added for each petriplates then stored in incubator. In this way, the treatment was given and data was recorded for 7 days.

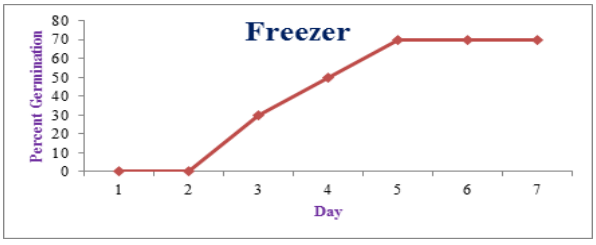
OBSERVATION TABLE:

Storage Temp and Humidity	Storage Duration	% seed germination	Length of Plumule (cm) after 7 day's	Fresh wt. of 10 seeds (gm)	Dry wt. of 10 seeds (gm)	Average no. of dead seed
Cold storage 5oc (H-70-75%)	30	100	3.90	3.92	3.03	0
Freezer (-3oc) (H-34-35%)	30	70	1.55	4.17	3.42	3
Refrigerator 13oc (H-34-35%)	30	70	0.46	4.47	3.75	3
Alternate sunlight (28oc) (H-10-15%)	30	40	0.50	4.60	3.99	6
Room Temp 25oc (H-50-60%)	30	70%	0.80	4.83	4.01	3

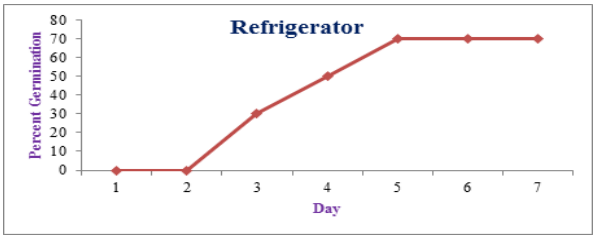
GRAPHICAL ANALYSIS:



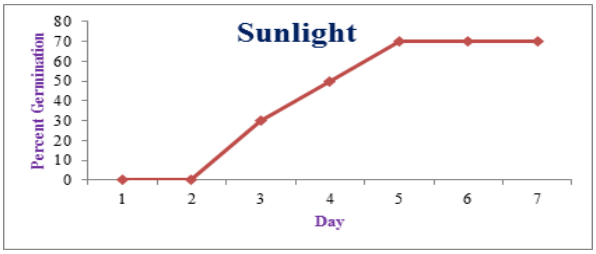
Graph 1: % seed germination in Cold Storage



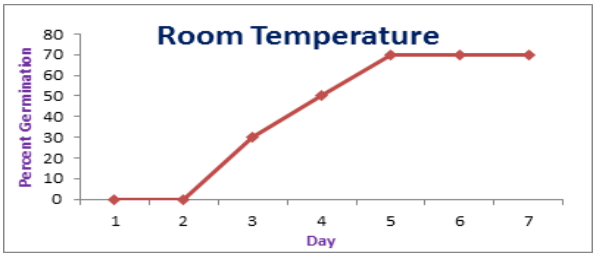
Graph 2: % seed germination in Freezer



Graph 3: % seed germination in Refrigerator



Graph 4: % seed germination in Sunlight



Graph 5: % seed germination in Room Temperature

RESULT & DISCUSSION:

The effect of storage Temperature and storage duration on germination of *Cicer aeritinum* L. is illustrated in table. Seeds that were stored at cold storage 5oc showed 100% germination and they also attain highest plumule length with 3.72 cm in comparison to other. The present study shows that the storage temperature significantly affects the seed germination capacity. Chauhan and Nautical (2007) reported that faster loss of seed viability at room temperature condition may be high metabolic activity at higher temp and due to loss of moisture which is the chief cause of seed deterioration under open condition.

There was gradual reduction in seed quality parameters during storage in all the storage condition, but the reduction process was much slower in cold storage 5oc condition compared to other storage temperature. The result of this investigation regarding the use of different storage temperature was in conformity to those of Arulnandy and Senanayake (1961), Singh and Maurga (1972), Gupta and Shakya (1976) in soyabeans seeds. The probable reason for slow rate of reduction in germination and vigour in cold storage condition is due to reduced rate of respiration and metabolic changes occurring in seeds as reported by Dasedal (1968) in Rajmah seeds. Under ambient storage condition excessive leaching of electrolyte Soluble sugars and free amino acids occurs as revealed by Doijode (1990) in onion seeds. The main reason behind this at low temp (5-7o c) there was no incidence of either insect or diseases, which is turn result in maintaining the higher seed quality parameter during storage in chickpea (Dwivedi and shukla, 1990).

Finally from the present study the result clearly indicated that the cold storage (5-70 c Temperature and 65-70% relative humidity) can be effectively used for storing the chickpea seeds.

CONCLUSION:

Storage temperature has an effect on the germination percentage of Cicer arietinum L. Present study concludes that the storage temperature highly affects the seed germination percentage in Cicer arietinum L.

The study indicated that the storage at cold storage 50c with relative humidity 65-75% can retain seed viability for longer period than other storage temperature and suggest it is the best storage temperature for the seed of Cicer aerithinum L.

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