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Assessment of physiological potential of stored pea (*Pisum sativum* L.) seeds

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Abstract

Research on pea seed capacity and the recognizable proof of proficient seed force tests for this species is still inadequate, particularly for cultivars that deliver wrinkled seeds utilized for utilization as a part of nature. The goal of this study was to check the precision of tests to evaluate the physiological capability of pea seed parts put away in various situations. Four seed heaps of two cultivars, "Peak" (uncertain development propensity) and "Matar" (determinate development propensity) were put away under various natural conditions for 8 months: a) research facility uncontrolled b) dry and frosty chamber (10 °C and 30% RH), c) controlled environment (20 °C and 70% RH). Seed power (quickenened maturing, electrical conductivity, seedling length and seedling rise) was assessed at first and following four and eight months stockpiling. Results demonstrated that the utilization of seed loads of high introductory physiological potential is basic for ensuring the craved execution of pea seeds amid capacity. Wrinkled pea seeds ought to be put away in the middle of harvest and sowing in a situation in which the entirety of the relative dampness (%) and temperature (°C) does not surpass 70. Physiological capability of pea seeds ought to be assessed by no less than two energy tests; thought to quickened maturing and Tetrazolium chloride tests is prescribe.

Keywords: *Pisum sativum* L., seed vigor, deterioration, storability.

Introduction

The pea is most ordinarily the little round seed or the seed-pod of the pod organic product *Pisumsativum*. Every pod contains a few peas. Peapods are organically a natural product, since they contain seeds created from the ovary of a (pea) blossom. The name is likewise used to portray other palatable seeds from the *Fabaceae*, for example, the pigeon pea (*Cajanuscajan*), the cowpea (*Vignaunguiculata*), and the seeds from a few types of *Lathyrus*. *P. sativum* is a yearly plant, with an existence cycle of one year. It is a cool season crop developed in numerous parts of the world; planting can happen from winter to right on time summer contingent upon area. The normal pea weighs somewhere around 0.1 and 0.36 grams. The juvenile peas (and in snow peas the delicate pod also) are utilized as a vegetable, crisp, solidified or canned;

assortments of the species ordinarily called field peas are developed to create dry peas like the split pea shelled from the developed pod.

These are the premise of Pease porridge and pea soup, staples of medieval cooking; in Europe, expending new youthful green peas was an advancement of Early Modern cuisine. The wild pea is limited to the Mediterranean bowl and the Near East. The most punctual archeological finds of peas date from the late Neolithic period of current Greece, Syria, Turkey and Jordan. In Egypt, early finds date from ca. 4800–4400 BC in the Nile delta zone, and from ca. 3800–3600 BC in Upper Egypt. The pea was likewise present in Georgia in the fifth thousand years BC. More distant east, the finds are more youthful. Peas were available

in Afghanistan ca. 2000 BC, in Harappa, Pakistan, and in northwest India in 2250–1750 BC. In the second 50% of the second thousand years BC, this heartbeat crop shows up in the Gangetic bowl and southern India. A pea is a most normally green, sometimes purple or brilliant yellow, pod-molded vegetable, broadly developed as a cool season vegetable crop.

Different elements straight forwardly impact seed physiological potential, including capacity conditions, which are central for keep up feasibility and life. This is essentially influenced by starting seed physiological quality, seed water content, relative moistness and temperature, activity of microorganisms and bugs, and the capacity period (Carvalho and Nakagawa, 2000). It is surely understood that seed decay is quicker and serious in tropical and subtropical areas because of the unfavorable pre-and post-harvest climate conditions (Baudet, 2003). Delouche *et al.* (1973) have characterized positive mixes of temperature ($^{\circ}$ C) and relative moistness (%) for putting away seeds of vital harvests in an uncontrolled situation. Hence, for a most extreme stockpiling time of 8 months, the aggregate of the relative dampness (%) and temperature ($^{\circ}$ C) not be higher than 80 or higher than 65 to 70 for a 12 to 18 month stockpiling period. In any case, in counterfeit situations and for delayed periods (5 to 15 years), this aggregate ought to be under 45 to 55.

The seeds might be planted when the dirt temperature achieves 10° C (50° F), with the plants developing best at temperatures of 13 to 18° C (55 to 64° F). They don't flourish in the mid-year warmth of hotter calm and swamp tropical atmospheres, however do develop well in cooler, high elevation, tropical territories. Numerous cultivars achieve development around 60 days after planting. Peas have both low-developing and vining cultivars. The vining cultivars develop thin tendrils from leaves that loop around any accessible backing and can move to be 1–2 m high. A customary way to deal with supporting climbing peas is to push branches pruned from trees or other woody plants upright into the dirt, giving a cross section to the peas to climb. Branches utilized as a part of this design are here and there called pea brush. Metal fences, twine, or netting upheld by a casing are utilized for the same reason. In thick plantings, peas give one another some measure of common backing. Pea plants can self-fertilize.

In right on time times, peas were become generally for their dry seeds. From plants developing wild in the Mediterranean bowl, steady determination since the Neolithic day break of farming enhanced their yield.

In the mid third century BC Theophrastus notice peas among the beats that are sown late in the winter as a result of their delicacy. In the first century AD Columella notice those in *De re rustica*, and Roman legionary's still accumulated wild pisi from the sandy soils of Numidia and Palestine, to supplement their rations. In the middle Ages, field peas are continually said, as they were the staple that kept famine under control, as Charles the Good, includes of Flanders noted expressly 1124. In the thirteenth century the writer Guillaume de Villeneuve noted *J'aypoisencossetouznoviaux* among the road cries of Paris. Green "patio nursery" peas, eaten juvenile and crisp, were an imaginative extravagance of Early Modern Europe.

In England, the qualification between "field peas" and "patio nursery peas" dates from the mid seventeenth century: John Gerard and John Parkinson both notice garden peas. Sugar peas, which the French soon called *mange-tout*, for they were devoured pods and all, were acquainted with France from the business sector greenhouses of Holland in the season of Henri IV, through the French representative. Green peas were acquainted from Genoa with the court of Louis XIV of France in January 1660, with some organized flourish; a hamper of them were introduced before the King, and after that were shelled by the *Sovoyancomte de Soissons*, who had hitched a niece of Cardinal Mazarin; little dishes of peas were then displayed to the King, the Queen, Cardinal Mazarin and Monsieur, the ruler's sibling.

Quickly settled and developed for earliness warmed with compost and ensured under glass, they were still a sumptuous delicacy in 1696, when Mme de Maintenon and Mme de Sevigné each reported that they were "a design, a wrath." Modern split peas, with their unpalatable skins rubbed off, are an advancement of the later nineteenth century. Peas are dull, however high in fiber, protein, vitamin A, vitamin B6, vitamin C, vitamin K, phosphorus, magnesium, copper, iron, zinc and lutein. Dry weight is around one-quarter protein and one-quarter sugar. Pea seed peptide portions have less capacity to rummage free radicals than glutathione, yet more noteworthy capacity to chelate metals and hinder linoleic corrosive oxidation. Moreover, creepy crawlies, for example, the pea leaf weevil (*Sitona lineatus*) can harm peas and other pod organic products. The pea leaf weevil is local to Europe, however has spread to different places, for example, Alberta, Canada. They are around 3.5 millimeters (0.14 in) 5.5 millimeters (0.22 in) long and are discernable by three light-hued stripes running

length-wise down the thorax. The weevil hatchlings eat the root knobs of pea plants, which are key to the plants' supply of nitrogen, and in this way, reduce leaf and stem development. Grown-up weevils feast upon the leaves and make an indented, "c-molded" appearance on the outside of the leaves.

Materials and Methods

Plant Material:

Experiment is conducted in PMAS-Arid Agriculture University on 30-10-2014 sowing is done in trays. Two Pea Varieties are used namely Climax & Matar.

Seed Germination Test:

Seed Germination Test is used to check the germination %age of both varieties.

Freezing Method:

Freezing method is used to check the behavior of seed when it suffering from freezing conditions.

Hot Water Treatment:

Hot water treatment is also used to check the germination %age after treating with hot water.

Blotter paper test:

The blotting surface test is a mix of the in vitro and the in vivo standards of examination. In this technique, the

Seed name	Treated	Untreated	No. of Petri plates	Seeds per Petri Plate	Total no. of seeds
Climax	04	02	03	04	12
Mator	04	02			

Nutrient Agar as a Planting Medium:

We use nutrient Agar medium for checking germination of treated seeds.

Seed Viability test

What's Viability?

A suitable seed is one, which is equipped for developing under the correct circumstances. Such a suitable seed could conceivably be promptly or instantly germinable. Torpid feasible seeds might

seeds are sown in petridishes other suitable holders on soaked permeable smearing paper, generally three layers to give enough dampness to term of the test.

Materials required;

1. Petridishes
2. Blotting paper
3. Seeds
4. Sterilized water
5. Forceps
6. Stereoscopic microscope
7. Compound microscope
8. Cotton
9. Spirit
10. Mounting fluid, slide and cover slip etc.

Procedures

- Required number of plastic petridishes was taken.
- The plates/petridishes were then flushed with methyated soul and were dried.
- The petridishes were left for some time to permit the soul to be radiated.
- Required quantities of blotching papers were absorbed cleaned water and three disinfected smearing papers were then set on each petridishes.
- Then 4 seeds were taken arbitrarily from a working sample.

require extensive particular medications before they turn out to be promptly germinable. We utilized two test for checking seed feasibility Tetrazolium chloride Test and Paper Towel Test separately.

Tetrazolium chloride Test:

Land tetrazolium or TZ test is strategy for seed practicality. Geological tetrazolium or TZ test is exceptionally helpful for quickly getting a sign of germination potential and suitability of tests and is in broad use.

Results and Discussion

Seed Germination Test:

There are two varieties which are used for seed germination test.

1. Climax
2. Matar

Some seed of both varieties are treated with Clorox and some are remain untreated.

Seed Name	Treated	Untreated	Total seed planted
Climax	08	08	16
Matar	08	08	16
Total seeds			32

Seed Germination %age

Seed name	Treated		untreated	Seed sown	Seed growth
Climax	08		08	16	02+06
Matar	08		08	16	05+05
Total	16	16	32	18	

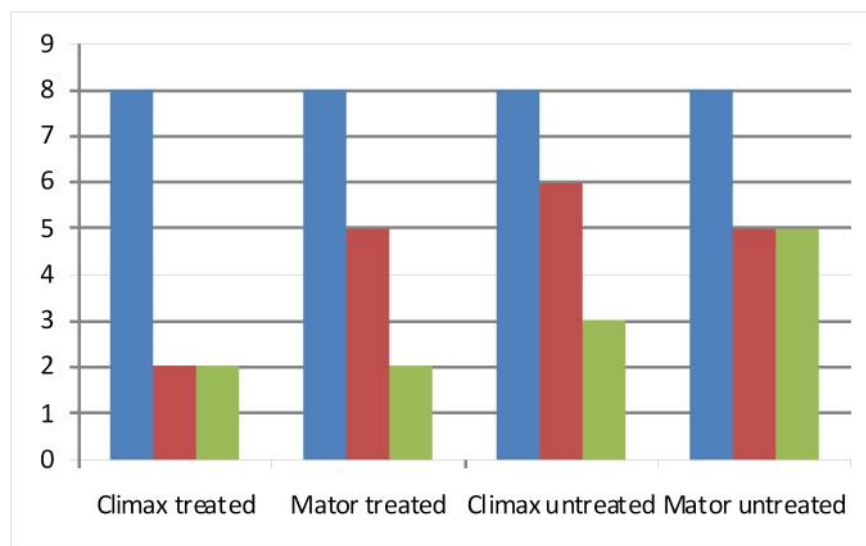


Figure of Seed Germination test

Seeds are treated further in different ways like freezing method, Hot water treatment, Salicylic acid methods.

Freezing Method:

In this strategy we take 4 seeds which are put on tissue paper and set them in a zip plastic sack and put them in the wake of naming in cooler at - 20 c for 24 hours to check the germination of seeds.

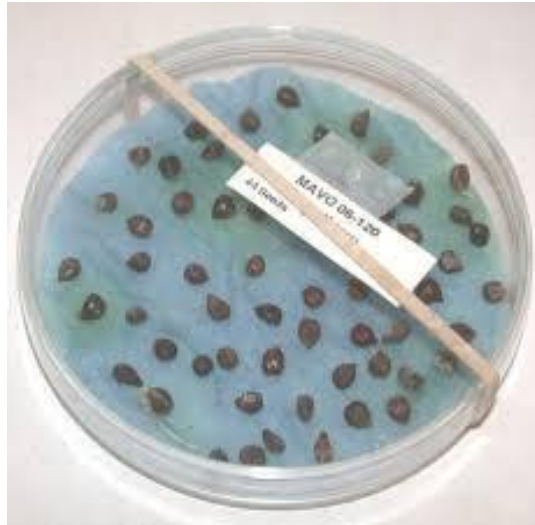
Hot Water Treatment:

Seeds with a hard or slick seed coat will here and there develop all the more promptly subsequent to treating with boiling point water. The water is warmed in a dish to 180' F., and after that expelled from the flame, and the seeds dropped in so they can splash for 12 hours or overnight. Some vegetable seeds react extremely well to this boiling hot water treatment.

Nutrient Agar as a Planting Medium:

Sanitized supplement agar has been utilized to grow orchid seeds. The Knudsen recipe is one usually utilized for growing orchid seeds. A comparative agar equation has been utilized to develop little seeds, for example, those of azaleas and rhododendrons.

The Randolph Cox agar recipe has as of now been specified for sprouting iris incipient organisms. A supplement arrangement has been utilized to buoy greenery spores for germination.



Seeds before Germination



Seeds after Germination

Blotter paper test:

Pathogens may associate: *Colletotrichum spp.*
Aspergillus spp. *Alternaria spp.*

Paper Towel Test:

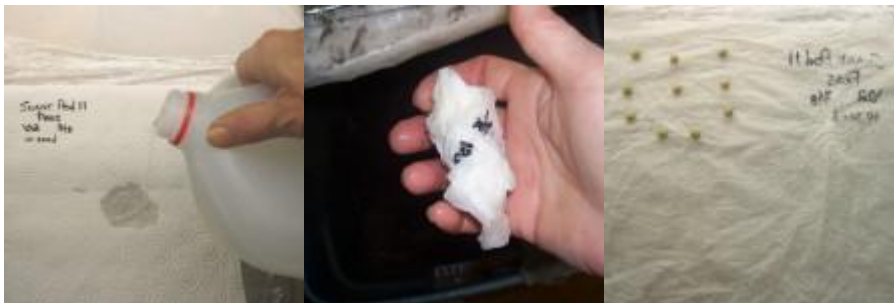
In the first place, lay out a bit of plastic wrap that is somewhat bigger than a paper towel. Next, compose

on the towel with a lasting business sector the subtle elements of the seed that you might want to develop. Make certain and compose the name of the seed and today's date, the date that you are setting the seed to develop. You will need to realize that data for later reference. On the off chance that you need a snappier germination you can absorb the seeds water overnight before you test them.



Pour a little water on your towel and afterward crush the additional water out of it. On the off chance that the earth for the seeds is excessively wet the seeds will

decay. Take 10 seeds out of your bundle and put on your towel. 10 seeds make it simple to figure the germination rate.



Fold the towel into fourths keeping the seeds separate, and after that overlay the plastic wrap around the

towel permitting one end to be marginally open for air. Seed is a living thing and needs a little wind stream.



Place your trial bundles in a warm place of no less than 70 degrees. A few individuals like to place them on the highest point of the cooler, yet bear in mind it. Mind it consistently to perceive how the seeds are advancing and to keep them damp. On Day 2 the seed has swollen marginally. The towel is somewhat dry so

I include around a teaspoon of water to keep it clammy. On the off chance that your seed surroundings gets to be dry your seed will kick the bucket. I will be keeping an eye on the bundles each day to tell you how the growing is tagging along furthermore so the seed does not dry out.



TZ Test:

In this biochemical test, living cells are made noticeable by diminishment of a marker color. The pointer utilized as a part of the TZ test is a vapid arrangement of a tetrazolium salt assimilated by the seed. Inside of the seed tissues, it meddles with the diminishment procedures of living cells and acknowledges hydrogen from the hydrogenizes. By hydrogenation of the 2,3,5-triphenyl tetrazolium chloride, a red, stable and non-diffusible substance, triphenylformazan is created in living cells.

Conclusion

From our exploratory work which we directed in our lab we inferred that Matar assortments has high practicality proportion when contrasted with Climax and indicate great seed wellbeing when contrasted with Climax. So, it's ideal to utilize Matar assortment rather than Climax which have high seed suitability and likewise solid seed.

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