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EFFECT OF LIGHT ON SEED GERMINATION OF V*IGNA RADIATA*

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ABSTRACT

Light is a source of energy for green plants. It plays an important role for the growth and development of plants. It helps in the process of photosynthesis, photoperiodism, and phototropism and photo- morphogenesis. Seed germination is an important physiological process in the life cycle of plants. In the present paper effect of light (different wavelength) on seed germination of *Vigna radiata* was studied. From the study it was found that earlier and maximum seed germination was observed in red light followed by green, blue and yellow.

KEYWORDS: Seed Germination, Light, Wavelengths and *Vigna radiata*.

INTRODUCTION

Green plants not only transform solar energy into chemical energy through the process of photosynthesis but also use light as an informational cue to control a multitude of physiological responses through their lifecycle. Collectively these responses are known as photo morphogenesis.[1] Such responses can be reversible such as stomatal closing and opening or irreversible such as seed germination. Plants get affected by the light quality (spectral composition), quantity, direction, and duration change depending on the season, latitude (magnitude of day-length variable), and local condition (weather, position within plant communities).[2] Seed germination is an important physiological process in the life cycle of plants. It is define as "the phenomenon where the seed sprouts for growing and developing into a plant". In the process of germination the seed develops into a seedling. The seed that germinate have an embryo inside it that grows into a new plant. Various internal and external factors affect the seed germination. The internal factors includes seed vitality, genotype, seed maturation and seed dormancy. While external factors include water, temperature, oxygen, carbon dioxide and light. *Vigna radiata* is consumed as whole grains, sprouted form as well as dhal in a variety of ways in homes. It is also used as green manuring crop. Moong can be used as a feed for cattle even husk of the seed can be soaked in water and used as cattle feed.[3] *Vigna radiata* is an important staple food of India. In the present study effect of light (external factor) on seed germination of *vigna radiata* was studied.

MATERIALS AND METHODS

The study was conducted at M. N. College, Visnagar.Visnagar taluka is situated in Mehsana, district of Gujarat State. Earlier Visnagar was also known as 'Copper City'.[4]

Geographical location**:** 23°42′N 72°33′E / 23.7°N 72.55°E[5]

Number of villages: 59[6]

Major Economy of the taluka comes from Agriculture sector.

- **Experimental setup**

The experiment was done using the boxes made up from red, blue, yellow and green cellophane papers to produce light of respective colors. The effect of light on seed germination of green mung beans (50 beans) was studied. Seeds were soaked and kept for germination in five different Petri-dishes. Each Petri-dish consist of 10 seeds.Using pipette 5ml of water in each Petri-dish was poured. Out of five, one Petri-dish was placed under the direct sun light and considered it as control/ reference. And other four Petri-dishes were placed inside the boxes of different colors i.e. red, blue, yellow and green to understand the seed germination in compare with the control. 5 ml of water with the interval of 24 hours was add till most of the beans of green mung in each Petri-dish could achieve seed germination. After 24 hours the status of seed germination was observed on each dish.The parameters which were observed are seed coat rapture, seed germination and no changes.

RESULTS

Table 1: Seed Germination in hours.

Sr. No.	Type of light source	Status of seeds	Hours			
			24	48	72	96
1.	Control	Ruptured coats	10	10	10	10
		Germinated seeds	10	10	10	10
2.	Red	Ruptured coats	9	10	10	10
		Germinated seeds	8	10	10	10
3.	Green	Ruptured coats	8	10	10	10
		Germinated seeds	7	10	10	10
4.	Blue	Ruptured coats	0	7	10	10
		Germinated seeds	0	7	10	10
5.	Yellow	Ruptured coats	0	2	9	10
		Germinated seeds	0	2	8	10

The above table shows the result of effect of different light on seed germination. The seeds were observed for 96 hours. After 24 hours in red light 8 seeds shows germination while in 9 seeds, seed-coats were ruptured. After 48 hours all the seeds show germination.

After 24 hours in Green light 7 seeds shows germination while in 8 seeds, seed-coats were ruptured. After 48 hours all the seeds show germination.

After 24 hours in Blue light no change was observed in seeds. But after 48 hours seed coat ruptured and seed germination was observed in 7seeds. After 72 hours all the seeds show germination.

Seeds kept under yellow light shows results similar to blue light i.e. no change was observed after 24 hour. But in yellow light after 48 hour only 2 seeds show seed coat rupture and seed germination. While after 72 hours 8seeds were germinated and in 9seeds, seed coats were ruptured. After 96 hours all the seeds show germination. While in control i.e. seeds kept under sunlight light shows seed coat ruptured and seed germination in all the seeds after 24 hour.

Much research has been done on the effects of various light wavelengths on plant growth. We know that different photosynthetic pigments within plants utilize different wavelengths for their growth and development.

Control

Red

Green

Blue

Yellow

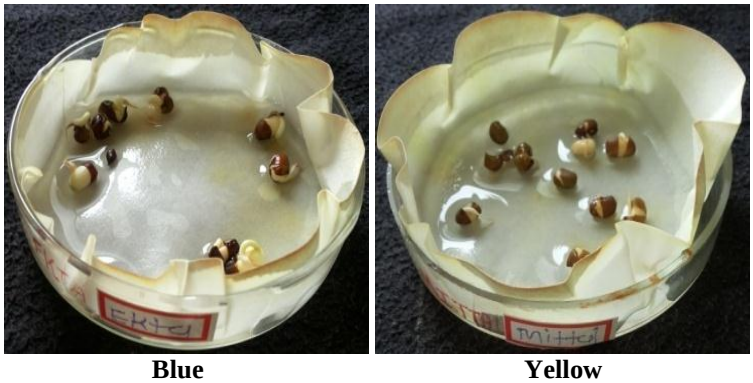
Fig: 1- After 24 hour.

Control **Red** **Green**

Blue **Yellow**

Fig: 2- After 48 hour.

Control **Red** **Green**



Blue **Yellow**

Fig: 3 -After 72 hour

Control **Red** **Green**

Blue **Yellow**

Fig: 4- After 96 hour

DISCUSSION

Under favourable environment, every single seed can grow into a seedling, but in reality that doesn't happen as there are many factors that affect the viability of seeds, including moisture, air, temperature, and light. Germination is the first important step in the life cycle of plant. There are four major factors that affect germination: Moisture, Air, Temperature and Light. Relationship between plant and light is confusing. Some plant needs light for germination while others prefer darkness.[7] Also different wavelength of light plays unique role in the life cycle of plant life.The present study revealed that the maximum seeds germination was observed in red light than green light, and minimum seed germination was observed in blue light than yellow light.

Through various studies it has been found that Blue light enables crypto chromes and phototropism to mediate plant responses such as phototropic curvature, inhibition of elongation growth, chloroplast movement, stomatal opening and seedling growth regulation.[8] It affects chlorophyll formation, photosynthesis processes, and through the cryptochrome and phytochrome system, raise the photo morphogenetic response. These wavelengths encourage vegetative growth through strong root growth and intense photosynthesis and are often used as supplemental light for seedlings and young plants during the vegetative stage of their growth cycle. Green light is sometimes used as a tool for eliciting specific plant responses such as stomatal control, phototropism, photomorphogenic growth and environmental signaling. Red light affects phyto chrome reversibility and is the most important for photosynthesis, seed germination, flowering and fruiting regulation.[9] Herysuyanto *et.al*., demonstrated that tomato plants showed the most growth in the vegetative phase under 650nm light.[10] In the germination phase, irradiation of 680nm spurred the greatest growth rate.[11] Similar result was found in the present study also i.e. maximum seed germination under Red light.

CONCLUSION

From the study it was found that earlier and maximum seed germination was observed in visible light followed by red, green, blue and yellow. From this study we can say that Red light plays an important role in the process of seed germination also we can suggest that it triggers seed germination in *Vigna radiata*.

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REFERENCES

1. Kendrick, R.E., and Kronenberg, G. H. M. (1994). *Photomorphogenesis in Plants*, 2nd ed. K.A. (Publishers, ed.), Kluwer, Dordrecht.
2. Chitose Kami, Se'verine, Patricia hornitschek, and Christian Fankhauser(2010): Light-Regulated Plant Growth and development. Chapt- 2: *Current Topics In Developmental Biology*. Pg: 29-66.
3. www.dpd.gov.in
4. www.nootangroup.edu.in
5. www.revolvy.com
6. www.census2011.co.in
7. www.thompson-morgan.com
8. www.ncbi.nlm.nih.gov

9. www.californialightworks.com
10. Hery Suyanto, Ni Nyoman Rupiasih, Dewi Handayani (2012): Influence of Light wavelengths on Growth of Tomato, Journal of Environment, Vol 12(2).
11. Gretchen Heber (2014): Wavelength Influence on Plants. *Horticultural LED lighting*.