EFFECT OF LIGHT ON GERMINATION OF MAIZE SEEDS

BY

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DEPARTMENT OF BIOLOGY/CHEMISTRY
NIGER STATE COLLAGE OF EDUCATION
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TITLE PAGE

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PRESENTED BY

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DEPARTMENT OF BIOLOGY/CHEMISTRY BEING A PROJECT REPORT SUBMITTED TO NIGER STATE COLLAGE OF EDUCATION MINNA.

IN PARTIAL FULFULLMENT OF THE REQUIREMENT FOR THE AWARD OF NIGER CERTIFICATION I EDUCATION (N.C.E)

AUGUST,2014

DECLARATION

I, Zainab Mohoh Musa hereby declare that this project effect of light on germination of maize sees is an original work based on research wholly carried out by me, and submitted to the Department of Biology, Nigeria, Certificate in Education, Niger State collage of Education Minna this project has not been submitted in part or in whole for the award of diploma or N.C.E in any other institution. All data gathered from public shed works have been duly acknowledged.

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Zainab Mohoh Musa

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Date

APPROVAL

This Project has been read and approved as meeting the requirement as prescribed by Niger State Collage of Education Minna in partial fulfillment for the award at Nigeria Certificate in Education (N.C.E).

SIGNATURE ..... DATE 12/09/2014
MR TITUS MATHEW
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SAMUEL GOSHIE
(H.O.D Biology)

DEDICATION

I Dedicate this project to Almighty Allah (S.W.T) for has love, care and Marcy Upon me who gave me the strength, courage and good health al through my life.

ACKNOWLEDGEMENT

My profound gratitude and praise is due to Almighty Allah for how he has brought me this far throughout my course of studies and my project.

And also Prophet Muhammad S.A.W. for has love care and Mercy Upon me.

I also Acknowledge my hard working supervisor, Mr Titus Mathew for has guidance consideration and tolerance throughout my project.

And also my appreciation goes to my family most especially my lovely mum and husband for their moral and financial support during my course of study May Almighty Allah guide, protect and keep them healthy, save and sound to reap the fruit of their labour.

My appreciation and thanks goes to the entire lecturers i.e Biology, Chemistry, Education and G.S.E lectures who have been working hard in passing positive knowledge to me through learning may God Almighty Guide and bless them abundantly.

ABSTRACT

An investigation on the effect of light on germination of maize seeds was carried out the information acquired in the study is aimed at improving the rate at germination of maize seed maize is now produced at a large scale to provide sufficient materials to our industries.

TABLE OF CONTENT

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Maize originated from South American. It was introduced at the early period into the whole world and now is cultivated in almost all the tropical countries.

More is produce in almost all part of the world such as India, Australia, North America and Africa etc.

In Nigeria maize is grown all over the country in the Southern part of the country, maize is grown earlier than northern part because: rain falls earlier in the Southern part.

Northern part of the country is noted for the producing large quantity of maize, due to the topographical aspect of the area, which is favourable for maize, production, though it is not all northern part that produces maize, places like Maiduguri, and some part of Gongolar State. The present Adamawa State and Sokoto inclusive produce little or no maize at all (M.F Komolafe (YS) collage at Ibadan).

Maize is a quick growing annual monocotyledonous crop, *it* is about 1.5 to 20.0 meters tall and has along strip leaves,

The unripe tender cube can be prepared in various ways it can be rusted and it can also be boiled. While ripe, the grain can also be prepared in various ways. Maize is some times cooked and served with salt and oil either groundnut or butter oil. The endo-sperm may be used in two ways first it can be ground into coarse fragment called homing or homing girls. These are used to make bread, hot cakes, and similar types of food.

1.2 SIGNIFICANT OF THE STUDY

The purpose of this research is to investigate the effect at light on germination of maize seed. the information acquired in the study is aimed at improving the rate at germination at maize seed, which will aid the production at maize in large scale to provide sufficient material to our industries. The study also aimed to stimulate students and other researchers interest to be aware of the effect of light on germination during their investigations or study. The effect of light on germination of maize (corn) seed.

STATEMENT OF' THE PROBLEM

Maize production for years has been on the decrease as a result of many factors militating the cultivation of maize

Hence the need for proper study and investigation into the effect of light on the germination of maize (corn)seeds in Nigeria.

1.3 LIMITATION OF THE STUDY

The time available for this research was not sufficient to be able to carryout several experiment.

This study also could not be exhaustively carried out because of inadequate funds (quality seed). so also the damages cause by some rodent (rats)and other factors contribute to the problems in countered during the study. Seeds used allure also purchased from the market and therefore very little is known about their production history.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Literature has shown that the seed remain dormant as long as it is dry. Many can survive for several years in this condition. When it is about to germinate; a seed absorbs several time it's own dry weighty of moisture and smells up.

According to R.H Stone (1985) Germination is the growth of the embryo .out of the testa so that it become enchoned in the soil as independent seeding or young plant

Germination in which the cotyledon remain below the ground is called hypogeal germination. If the cotyledonous are can-led into the air thing. Germination, is epigeal. He go further to say most monocotyledonous are hypogeal and most dicotyledonous are epigeal, in their germination. Prof. D.W. Emer in reprence university of Ghana (1972) said, that germination involves the conversion of stored food into the substances in the living cells of the developing seeding.

This substance are all insoluble in waters and before they can be utilized they must be converted into soluble forms. In fact the first important event. In germination of a soaked seed is the production of enzymes, such as arnylase which convert starch to sugar, proteases which proteins amino acids and lipases which convert proteins to glycerol.

The radicals is the first part of the embargo to start growing when germination starts, it along ate, and forces its way through the testa. As it grows it required a variety at substances in addition to water. These include amino acids for synthesis of protein for its new cells and sugar for conversion into the cellulose of its new cell walls. These substances are carried in solution form, the food store in the growing tip of the ridicule.

As the germination proceeds the plumose is lifted above the soil either by the elongation of hypocotyls as in the comp ear or by the growth of the epicotyl's as in Mauna in maize the plumose is protected during its upward growth by the sheikh like conceptive. Eventually the first leaves are expanded and the seeding becomes self supporting.

Hail J.R(1970)in represented university of Ghana. Said that during germination of maize seed water is absorbed into the endosperm. Causing the grain to swell up. The starch and protein are digested to soluble with the help of special enzymes striated by the scuttled. The soluble food is then absorbed by the scuttle which then passes it to the growing ridicule and plumose.

The ridicule elongates and is accompanied by coleomliza. These two structure then bust through the craft of the grain at the narrow end. Som the ridicule penetrated the coleoliza the torn edges of which form a collar-like structure at the base of the radical. The clatter grows into the soil to only a certain extend after which it show down and finally stops growing mean while a number of adventitious roots develops from the base of the epicotyls penetrate the cast of the grim and form a fibrous system.

While all this happens, the plumose and coleoptiles bust through the coat of the grain at the broad portion and are carried power above the surface of the soil. This happens initially by the, rapid elongation of the epicotyl. The rest of the grain including the cotyledonous, remain below the surface of the soil. Following this both the plumuke and coleoptile elongate until finally the former bust through the latter. It then begins to produce the first of liage leaves and gradually develops into the short system.' Soon after germination

the food stored in the endosperm is used up and the remains of the grain shrived and dry up. The maize grain displays hypogeal germination because its cotyledon remain in the soil.

Cozen (1985) stated that, like monocotyledonous in general, maize germinals hypogeally. The coleorliza lengthens and bust through the coat of the grain. Then the radicle pushes its may through the colerliza, and at the same time the coleoptile grows out from the garin and up through the soil. When the tip of the coleoptile reaches the surface, the plumute breaks through it and first foliage leaf out. The single cotyled6n temain inside the grain converting the starch in the endosperm to sugar for the embryo, the redicle does not develop very much, but a fibrous roof system develop from the base of the coleoptile.

2.2 **THE CONDITON** NECESSARY **FOR GERMINATION**

Seed face great dangers before thy can germinate into seeding they are often destroyed by excessive heat or cold by animal that feed on them crush them to useless bats. If seed that normally grow in rather dry soil should by any chance fall into the sea, river, or pond they may not be also to germinate and grow. Some of these condition are external while others are internal. The

external condition necessary for germination are water, air or oxygen and suitable temperature. While the internal conEition include enzymes, energy and the viability of seed.

1. WATER

A non- germinating seed contain very little water, however, for the initation of germination its need excess water to activate its cells. Therefore a seed absorbed a large amount of water through its micropyle. In many cases water can enter through the seed coat, which is porons. The protopism, when saturated with water, becomes active. The absorbed water also activates the enzymes in the cells and dissolved the stored food. Water is the media in while all chemical and enzymes reaction proceed, water is also the medium of a transport of dissolved food substances through the various cells to the growing region of the redicle and plumale.

Beside water soften the seed coat which can consequently and facilitate emergence of the ridicule and plumale.

2. AIR (OXYGEN)

All living cells need energy to activate their protoplarm for cell division and growth.' This energy is obtain by the oxidation of food substances stored in the seed through respiration. Oxygen is necessary for respiration.

Therefore, air is another important factor which is necessary for germination. Seed burred deep in the soil do not germinate due to lack of air. They also fail to germinate in met or water-logged soil which is usually very poor aerated.

2. TEMPERATURE

Mots seed required a suitable temperature range for germination. Seed will not germinate at temperature below 00C or above 450C, the best range of temperature or the optimum temperature range, for germination is between 28°C to 37°C. At high temperature at very low temperatures they become inactive.

Therefore the protoplasm and the enzymes fuction best within the optimum temperature range. The rate of germination increases with temperature until it reaches a maximum value at the best, or optimum temperature. This varies from one plant tc the others.

4. ENZYMES

Many important activities such as respiration and the utilization of food substances cannot go on without the help on enzymes. Respiration required enzymes.

5. ENERGY

If life is to go and cells are to perform all their activities energy must be available. In germinating seed, a large supply of enzymes is essential for maintaining the activities of the rapidly developing and growing embryo. Energy is obtain from the food stored in the endosperm of the seed.

6. VIABILITY OF SEED

The most important internal condition for the breaking of quiescence is that the embryo should be viable or alive. Many seeds that have been stored for several years may have lost their viability.

As a result, germination will not occur in these seeds. However, there are seeds that can survive for several years.

Seed of some aquatic plant have been found to be viable even after 200 years onaa herbariusn sheets, seeds of weeds frequently have aviability of about 50

years, provided that they are properly store and not damage by rodents insects or fungi.

7. DORMANCY

The seed of some plant are able to germinate as soon as they mature. It is not uncommon to find ground nuts spouting in pods still attached to the parent plant. In many species, however, the viable seed have, after dispersal, a distinct rest period, during which they fail to germinate even through condition of water, oxygen and temperature are suitable. Such seed are said to be dormant.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This chapter has to do with the method and materials through which the experiment was conducted or carried out.'

3.2 MATERIAL USED DURING THE EXPERIMENTATION

The following material were used during the experiment.

i. Petri dishes

ii. Beaker

iii. Cotton Wool

iv. Measuring ruler

v. Water

vi. Maize seeds

3.3 THE EXPERIMENTAL PROCEDURE

A piece of cotton wool was placed at the bottom of each of the twelve petri dishes; twenty maize seeds of similar sizes were placed on each of the twelve petri dishes with the cotton wool; in each of this petric dishes. Small amount of water was added to moisten the cotton wool in them.

Out of these twelve dishes containing the seed, four were kept in the dark cardboard. That is completely out of light through out the experiment. Another four set of the petri dishes were kept in open place that is they are exposed to light through out the experiment. The last set of the four petri dishes were kept in the light, that is, an open place for twelve hours. They were taken in to the dark cardboard to remain there for the rest twelve hours of the day.

For each day, the number of germinated seeds were noted and recorded in each of the path dishes in the three different experimental set.

CHAPTER FOUR

RESULTS

4.1 INTRODUCTION

This chapter concern itself with the interpretation of data obtained during the experiment.

The data were obtained by studying the germination of maize seeds under three different experimental condition that is light, light/darkness and total darkness.

The percentage germination for each experimental set up was noted and recorded in the table below.

TABLE 1

Showing the percentage germination of maize seeds

DAY OF GERMINATION	PERCENTAGE GERMINATION IN EACH EXPERIMENTAL SET UP		
	LIGHT	LIGHT/DARKNESS	DARKNESS
First day of planting	0%	0%	0%
Second day of planting	10%	11.25%	8.8%
Third day of planting	77.5%	71.3%	65%
Fourth day of planting	90%	90%	80%
Fifth day of planting	96.3%	93.7%	93.7%

TABLE 2

DAY OF GERMINATION	PERCENTAGE GERMINATION IN EACH EXPERIMENTAL SET UP		
	LIGHT	LIGHT/DARKNESS	DARKNESS
First day of planting	100%	100%	100%
Second day of planting	90%	88.75%	91.2%
Third day of planting	22.5%	28.2%	35%
Fourth day of planting	10%	10%	20%
Fifth day of planting	3.3%	6.3.7%	6.37%

The table 2 above shows the percentage of ungerminated maize seeds.

The table 1 above shows that at the first day of planting no germination takes place in all the three different experimental set up as shown in the table.

At the second day of planting the percentage germination of maize seeds that were exposed to light, light/darkness and complete darkness was 10%, 11.25% and 8.8% respectively.

On the third day the percentage of germinated seeds was 77.5%, 71.3% and 65% of light, light/darkness and complete darkness respectively.

On the fourth day of germination the percentage of germinated seed for light was 90% germinated light/darkness 80% and 90% germinated for complete darkness.

After the fifth day of germination an average of 90% maize seed germinated in all the three different experimental set up. With the total percentage of 96.3%, 93.7% of light/darkness and complete darkness respectively.

The result shows clearly that light intensity has little or no effect on the rate of germination of maize seed, due to the insignificant differences between the three different experiment set up as shown in the data obtain in table one. In other words that the maize seeds germinated equally well in light and darkness or in partial light and darkness.

TABLE 3

	LIGHT	LIGHT / DARKNES	DARKNES
Percentage germination	96.3% 2.43cm	93.7% 2.42cm	93.7% 4.67cm

In the table 3 above the average length of germinated maize seeds for light 2.43 centimeter and that of the germinated maize seeds in light/darkness was 2.42 centimetre. From this result it emplies that there is no any significant change between the length of germinated seeds in the light and light/darkness.

On the other hand the average length of germinated maize seeds in complete darkness was 4.67 centimetre long. This shows a remarkable difference between the length of germinated maize seeds in the light, light/darkness and complete darkness.

It is therefore likely that light has a remarkable role to play in the growth of maize seedlings.

CHAPTER FWE

SUMMARY AND CONCLUSION

Germination according to R.H Stone (1985) is the growing of the embryo out of the testa so that it becomes enchored in the soil s independent seedlings or young plant.

The seed germinates if a number of external and internal condition are fulfilled; these include availability of water and oxygen, suitability of temperature and viability among others.

In this investigation light, intensity seems not to have any significant effect on germination of maize seed.

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