IMPACT OF DARK ROOM ON THE SPROUTING PERCENTAGE OF HOT PEPPER

BY

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CERTIFICATION

This project work has been examined and approved as meeting the require ments of Department of Agricultural Technology, Institute of Applied Scienc

e, Kwara State Polytechnic, Ilorin, Kwara State. In Partial Fulfillment of the Requirement for the Award of National Diploma (ND) in Agricultural Technol ogy.

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DEDICATION

I dedicate this project firstly to God Almighty, for the opportunity He gave u s to this very point in our life and studies. And also specially dedicated to ou r lovely and wonderful parent.

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ABSTRACT

A field experiment was conducted to examining the impact of darkroom on the sprouting days and percentage rate, the experiment was placed i n improvising box as darkroom and hot pepper seed was planted inside seed tray with replicates some inside dark box as darkroom while other are placed outside on a direct sunlight, bright day. There was in observat ion for the period of (24) twenty-four days as at 9th days sprouting was o bserved on darkroom at 1% while non on day light experiment but as at 15 to 20 days about 12 to 18 sprouting which was about 37% was recor ded in darkroom while that of daylight 10 to 25 sprouting with about 5 0% as at the end of the experiment it was observed the day light experim ent had the highest percentage sprouting of about 99% to darkroom of a bout 82%, showed the hot pepper prefer daylight on sprouting level than darkroom.

CHAPTER ONE

1.1 Introduction

Hot Pepper Scotch Bonnet Pepper (capsicum annum) is one of th e most important commercial crops in Nigeria. It is grown almost throug hout the country. There are more than 400 different varieties of chill pep per found all over the world. It is also called as hot pepper. It botanical n ame is capsicum annum and also a herbaceous plant belonging to the f amily Solanaceae. It is an important vegetable crop that is grown throug hout the world especially in the topic. Pepper has increased in popularity values and importance over a long period, thus making it an indispensab le part of the daily diet of millions of Nigeria.(sources)

Scotch bonnet (capsicum annum is a wonderful vegetable crop th at may be eaten raw or cooked. It is an important source of vitamin A, vi tamin C and vitamin B6 it protects the body against disease attack and preventing health promoting disease (Amarzon 2012-2017). Today they are great commercial interest and are by one fourth of the global popula tion (Barboza *et al.,* ...2022)

Hot pepper have higher levels of capsicum than sweet pepper. Th e levels of heat of a hot pepper is ranked on scollive scale. Peppers with higher scollivie heat units (SHUs) are hotter, pepper can be produced in t

he field and under greenhouse farming using conventional and organic p rocedures. Conventional production of pepper in the field is easily adopt able by farmers because of it productivity in the short run (Dennis S. Ash ilenje, Kitale, Kenya 2013) however the crop respond to both organic and in organic fertilizer which has been reported by several researcher (Aliyu 2002 Khan *et al.,* 2010) studies review that various crop response to inor ganic fertilizer in different ways, the use of inorganic fertilizer could main tain or not maintain the higher yield in some crop, for example capsicum annum over the years shown emergence of micronutrient produce by thi s inorganic fertilizer which result in deteriorations of soil physical propert ies (Khan *et al.,* 2010).

1.2 Production of Scotch Bonnet Pepper

Previous researcher has reviewed the nutritional requirement of p epper as an antiodants and hypoglycanic activities (loizzo *et al.,* 2015) (T undes *et al.,* 2013). The crops respond to both organic and inorganic ferti lizer. Scotch bonnet pepper is a lucrative business in Nigeria the country has a favourable climate for cultivation of this pepper and the crop has a high demand in the local market and for export.

The price of pepper in Nigeria has been subjected to sessional fluc tuation over time. In south western Nigeria, pepper has been massively

convey from northern Nigeria despite the fact that it is also grown in the south west. This indicate that there is a great and urgent need for an inc rease in pepper production in Nigeria, especially in south western Nigeri a.

The domestic demand for pepper has increased over time which h as resulted in the decline in the quantity of pepper being exported in sev eral producing countries. This signifies that there is a need for an increa se in the supply of pepper to make up for the increase in the domestic d emand and to also give room for exportation.

It is worthy of note that despite the production level of pepper in N igeria, pepper is still being imported. A general increase in pepper yield i n Nigeria could be enhanced by the cultivation of improved cultivators (J ackson
RD *et al.,* 2007)

1.3 Aims and Objectives

Impact of darkroom on the sprouting percentage of hot pepper se eds.

1.4 Specific Objectives

- To examine the sprouting days
- To compare sprout effectiveness on dark and light condition.
- To examine the sprouting percentage.

1.5 Statement of the Problems

The price of hot pepper in Nigeria has been subjected to seasonal fluctuation over time in south western Nigeria, pepper has been massiv ely convey from northern Nigeria despite the fact that it is also grown in the south west. This indicate that there is a great and urgent need for a n increase in hot pepper production to meet the heavy population and th e production level as a great chart emerge as a result of unstable weath er/climatic condition.

1.6 Justification

Hot pepper is referred to as "Atarhu" in Hausa, Atarodo in Yoruba, i t is used as spices in preparing soups, spicy dishes or are used as medic ines, cosmetic and plant insecticide according to (Take el at 2012, and D ognoto 2013).

CHAPTER TWO

LITERATURE REVIEW

2.1 Harvesting Scotch Bonnet

Scotch bonnet pepper grown for fresh use should be harvested when th ey are at good marketable size (10cm long)

Colour is an important item of quality therefore finite should be harvest ed when they are red or start to turn red. Harvesting can be done once o r twice in a week so as to allow enough time for ripening with good care. Scotch bonnet pepper can remain productive for 2 years (Manlita *et al.,* 2020). Peppers maturity is in time distant stages during their developm ental stages, these stages are immature green, mature green, and matu re red. It starts from immature green to mature green, pepper fruit incre ases in firmness and pungency the cell walls thicken and no colour chan ge occurs. Mature green peppers are particularly developed and can be consumed fresh or in processed form. Harvesting of immature green pe ppers result in poor colour, flavour and short life span (Iyun B 2012). Mild fresh peppers grown for fresh use should be harvested when they are at good marketable size (10cm long and 5cm in diameter) with dark green colour. They should be firm and crisp but not so mature as to have begu

n losing their desirable greenness. Small young peppers are rather soft and yield readily to mild pressure of the fingers. Although quite edible at such stage, they are lacking optimum quality and food value.
Growers who harvest soft fruits will not be getting the potential yield fro m their crops (Gez Cornish and tom brabben 2007).

2.2 Processing and Preservation

Post-harvest is an integral part of agricultural production and utilization system, it is of importance in loss reduction, value addition, food securit y employment and income generation. Therefore, there is an urgent nee d for post-harvest technology revolution with strong linkages to proper p rocessing, preservation, storage marketing and distribution of pepper fru it (Odeyemi o.o 2013) in appropriate post-harvest handling of pepper co ntinues to result in varying degrees of losses. Handling must be seen as part of an integrated systematic approach aimed at improving quality of the final product (Kader A A 2008) Shriveling occurs due to moisture los s of about 4 percent or greater between 12 to 24 hours of harvest. Physi ologically pepper fruit lack natural wax at immature stage which will has ten moisture loss and subsequently quality loss and mechanical damag es such as abrasion cuts and bruises affect the chemical composition p ericarp tissues of scotch bonnet fruit. Vitamin c content was lower by 1 5% in bruised locular tissue than in fruit without physical damage. (Moro

tti cl, sargent S.A, Huber D, Calbo AG, Puschman R 2000).

Peppers stored above 7.5ºc suffer water loss and shriveling storage bel ow 7.5ºc is best for a maximum shelf life for 3-5 weeks. Pepper dried to safe moisture content packed tightly in sacks, can be stored in non-refri gerated warehouses for up to 6months. Storage under low temperature reduces loss of red colour and slow down insect activities. Rapid precool ing of harvesting pepper is essential in reducing marketing losses and th is can be done by forced air cooling, hydro cooling or vaccum cooling. If hydro cooling is used care should be taken to prevent mold growth. Rela tive humidity of 60-70% is too higher, if the relative humidity is too low (b elow 10%), pod may be too little that they may shatter during handling, r esulting in loss (Daramola Am, Okoye W.L 2000).

2.3 Method of Processing and Preservation

Method of processing are critical in presenting the benefit properties of capsicum among the vitamin ascorbic acid is very susceptible to chemic al and enzymatic oxidation during the processing, cooking and storing of product. Unbalanced pepper lost more than 97% of their vitamin c within one month of freezing at 23ºc blacking reduces vitamin c content by 2 8% in vaccum sealed lost 10% in 12 months of storage (Hagg M, Hakkin en U, Kumpularen J, Ahuenanen R, Hurime E 2010, Daramola Am, Okoye wl 2011).

In an effort to reduce some of these loses, which cannot be thoroughly handled by other food preservation like canning, drying, refrigerating and heat pasteurization (Gee Harold MC 2010).

Method of Preservation

The preservation of peppers help in the following ways to increase the e conomic value of the product by transforming it from one form to anoth er to remove inedible parts of product to improve taste to inactivate enz ymes to make packaging easier to reduce the cost of transportation to make food available where it is not produced to increase profit and to co ntrol shortage (Brecht J, Bergsma K, Sachez E, Snyder G 2000).

2.4 Protection Against Spoilage

Several flavour compounds were identified in fresh pepper and pepper mash 2 pentanoc, 3 hexanol acetic acid, ovic acid and linovic acid, howd er the compounds 2 undecenal, farnesol, 2 pentacle, 1 ollinolenic acid an d squalene are found only in the fresh pepper and not processed produc ts. This suggested that the observed browning reactions in the mash co uld be an interaction of physio-chemical and microbial degradation but it is yet to be confirmed (Gorgus *et al.,* 2015). Spoilage in pepper mash ma y be induced by exposure to heat and fax oral route infections, or chang e to metabolic processes resulting in undesirable changes in texture, aro ma, taste or appearance. More often spoilage is induced by exposure to

air micro-organism (bacteria yeast and molds) or improper storage or co nditiers (Bidgemohan *et al.,* 2018:2017).

Microbial spoilage in hot peppers products can be visible as mold growt h embedded in a mass of filaments with brown colour change due to ba cteria acidictation cause by L. megentroides (Kal 2000) listeria spp (quid ensubsp, gasicomtatus L pisium (pothakos, vasilerious *et al.,* 2014) and elostidium perfungens and staphylococcus aurcus (Draughton *et al.,* 200 4) the physio chemical changes are observed in the top layers as brown pigments. This may be both PH and temperature dependent. Increasing PH can affect the rate of non-enzymatic browning reactions as function s of temperature (Gogus and Sami 2000) (Flures *et al.,* 2010) noted that while fermentation of chili pepper is dependent on several factors includ ing microbial flora, nondesirable microbial growth could be controlling us ing caclz treatment (Lee, Jang and Hwang 2006).

2.5 Shelf-Life Management

Two third of the worlds population is inadequately fed and yet millions o f kilograms of food and pepper are wasted each year as a result of poor and inadequate storage and handling facilities (Olorunda A.O and Abeeb a F.O 2002). Fruit and vegetables like tomato and pepper are food items that are very vital in human diet, right from infants to the aged ones. Th e importance of these essential food items are very vital in human diet

brought about their preservation in order to spread their availability throu ghout the year. In the latest few years, many technologies, such as edib le coating with anti-microbial agents, low temperature, high temperatur e, controlled atmosphere package and so on, have been developed in or der to maintain the quality and safety of fruits and vegetables, which co uld prolong its shelf life during the storage and market periods (Youwei a nd Yinzhe 2013, Gualanduzzi *et al.,* 2009, yinshe and shaoying 2013). Lo ss in quality and quantity, the ideal storage temperature for fresh pepper is 45ºf (7.3ºc) but they will last about one week in a typical home refrige rator (which should be at 40ºf or 45ºc) fresh, whole pepper will last long er if they are kept dry. Like most fruits and vegetables, peppers should be washed just prior to consuming or preserving, to wash, rinse well und er clean, cold water gently rubbing to remove dirt or soil microbial spoila ge of food is a limiting factor for shelf life of fruit (Akinmushe 2011). In o rder to keep fruits and vegetables from losing their turgidity farmers or marketers often times sprinkle water on them after harvesting and the l ow temperature condition encourages the growth of micro-organism an d this cause vegetable and fruit to spoil if not sold immediately (Murray *et al.,* 2017).

2.6 Value Addition

Peppers are a rich source of important vitamins minerals and nutrients

which make them extremely beneficial to human health (Beanas N, Belo vic M illie N, Moreno D 2019) locally in Nigeria the vast population of peo ple consumes red scotch pepper only and some do remove the seed bef ore grinding, the health benefits associated with the consumption of pe pper and more importantly their therapeutic effects have been well docu mented (Natesh HN, Abbey L, Asiedu S.K 2017) vegetables are essentia l for food security and nutrition (Natesh HN, Abbey L, Asiedu S.K 2017) b ecause of the vitamins, minerals, phytochemical components and dietar y fibre, they contain are beneficial to human health (vigeret T.G Songur A.N arak o Calaroglu F.P 2018) peppers comes in a variety of kinds in th e Nigerian market, capsicum genus has over 30 species, five of which (*C. Annum*, *C. Frutenous*, *C. Chinese*, *C. Baccatum* and *C. Pubes Cens*) h ave been domesticated and mostly farmed for human consumption (Ga rcia-gonzailez C.A Sivlar C 2020) pro vitamin A, vitamin E and C, caroten oids and phenolic substances such as capsaicinoids, luteolin and querce tin are all found in pepper. All these chemicals have antioxidants propert ies and perform other biological function (Batiha G.E, Alqautani A ojo O. A shaheen H.M Wasef L 2020) in addition, pepper is the most widely us e spice in the world, and it is prized for its spiciness and ability to enrich t he flavour of a variety of dishes (Elzenity M. ismail M. shalaby M. Murita la T 2020). Pepper is an important commercial commodity that is used a

s vegetables, spices and in some value-added processed foods. Phyto c hemical and vitamins such as vitamin A, vitamin C (Ascorbic acid), iron, vitamin B, carotenoids, niacun, riboflaxin, dietary fibre, flavonoids and m agnesium are abundant in scotch pepper bonnet pepper (Guil-guencreo J.L, Martnez gurado 2000).

2.7 Availability of Hot Pepper

In Nigeria, hot pepper is referred to as 'Atarhu' in hausa 'Atarodo' in Yoru ba. It is used as spices in preparing soups, sauces, spicy dishes or are u sed as medicines cosmetic and plant insecticide (Take *et al.,* 2012, Dogn oko 2013). Fruit and vegetable production is limited in Nigeria to certain season and localities because they deteriorate a few days aafter harves t. Amongst the available vegetables, pepper (capsicum spp) is ranked th ird in the world (faosta 2012 mustapha *et al.,* 2021) in Nigeria pepper is t he second most cultivated vegetable (Abu *et al.,* 2020) which used to av erage consumption per person per day is about 20% (ogunbo *et al.,* 201 5). In combination with other agricultural produces almost 70% of the far mers and traders depend on pepper for food security. Scotch bonnet pe pper is available year rounding with a peak season in the summer throu gh fall.

2.8 Health Benefit of Scotch Bonnet

Capsicum ($C18H_27N0_3$) is an alkaloid compound believed to be found o nly in peppers. It is responsible of their characteristics hot taste or pung ency the level depending on the concentration of capsicum in the fruit a nd is variable between species among fruits of the sme plant and amon g different parts of the same fruit (canton, flick *et al.,* 2008) habitually pe ople eat this botanical spice in raw, dried and cooked from and it is also used in making paste, pickle, and sauce. Although from place the name and the type of capsicum bemics vary greatly in colour, shape, size, app earance, flavour and pungency. (Gomez Garcia MD, ochoa-alyo N 2013) surprisingly, approximately 35 species of capsicum exist in nature only fi ve have been domesticated for human consumption, namely, capsicum annum (ancho/poblamo, bell, cayenne) capsicum baccatum, capsicum c hinese, capsicum, fruitsen and capsicum fruitsen. (Carrizo Garcia c, barf uss MH, sehr EM, Barboza GE 2016) of these species, the capsicum ann um is the most economically important cop due to its pungent odour an d taste.

The placenta tissue and seeds of scotch bonnet pepper (c. annum) are reported to contain most of the capsicum with 62 and 37% respectively (Gonzalez *et al.,* 2009) capsicum benefit include anticarcinogenic, antiox idant, anti-mutagenic, immune suppressive, hypocholesterolemia and b

acterial growth inhibition effects (Grubben and El Tahir 2006) in tradition ally medicine, hot pepper is used to ease digestion, stimulate the gut, co mbat constipation and reduce pain capsicum may have also a potential role in the development of pain killing agents (Patwardhan *et al.,* 2010). Since pepper are easy to grow, harvest, process and utilize, efforts shoul d be undertaken by extension worker nutrition.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Materials

- Improvising box and darkroom
- Seed tray/polythene bags
- Hot pepper seed
- Growth medium(cocopeat)
- Spraying cana
- Hydrogen perodixer
- Big bowl as water container

3.2 Preparation of Nursery Seed Tray

The nursery stage comprised of seed tray, cocopeat, as the growth me dium, pepper seeds. The preparation was by sterilizing of the seed tray with hydrogen perodixes solution and those materials were deep inside for some minutes then the seed tray were filled with growing medium (c ocopeat) and irrigate the filled tray with water till point of saturation or s ocked with water for easy sprouting.

3.3 Experimental set up

Since we are comparing the impact of darkroom to open areas or f

ield the sprouting percentage, a big box container were constructed of a bout 24_{cm} by 120_{cm} parameter size with a cover and size seed trays wer e given the same treatment in terms of filled work cocopeat, wetting an d planting of hot pepper seed were placed inside the box and well cover ed to create deserved darkness while other are placed outside and be o bserved for the next three to five days to determine the sprouting perce ntage.

3.4 Irritation methods

On the experimental set up, the irritation was carried out three times da ily with enough water for both set up those inside the dark room/box an d outside water supplied was timed, the first wetting in the morning 8:a m, second in the noon 12:pm and third wetting afternoon 3:pm till the ti me of appreciable sprouting was appeared.

3.5 Source of hot pepper seeds

The seeds are derived from purchases fresh hot pepper and we dissect it to get the seeds inside and we used wood ash as protectives and pres erved material for possible viability. The seeds was placed on open air f or dryness for two days then we use as planting material for the experi ment to determine the sprouting percentage.

3.6 Data collection on sprouted percentage

Hot pepper seeds & seed tray

Table I

A

B

Dark room **Open lighted**

Table II

Dark				**Light**			
Days	No Sprouted		%	Days	No Sprouted		%
3	F -	CF	-	3	-		-
6	-		-	6	-		-
9	1		-	9	-		-
12	6	7	-	12	15		-
15	12	19	-	15	10	25	-
18	18	37	-	18	25	50	-
21	30	67	-	21	25	75	-
24	15	82		24	24	99	