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ARTICLE

Effects of Chemical Mutagen (Sodium Azide) on Onion Grown in Organic and Inorganic Fertilized Soil

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ABSTRACT

The effects of chemical agent (Sodium Azide) on Onion growing in organic and inorganic fertile soil was to be examined during this study. The analysis work was carried out within the green house of the research laboratory technology of the Oke Ogun Science Laboratory Technology, Saki, Oyo State. Onion seeds were soaked inside different beakers containing the mixture of Sodium Azide and water mixed with 10 ml of Phosphate solution for 4 hours. Also, the control was soaked with normal water and 10 ml of Phosphate buffer solution. The treated seeds of onions was planted in plastic containers containing 4.2 g of weighed humus soil within the green house at the Department of research lab Technology of The Oke Ogun polytechnic school, Saki Oyo State. The samples parameter were taken daily for six consecutive months. The result obtained was additionally subjected to statistical analysis by using DMRT techniques. The results showed that the stem length was ranged from 11.39±0.62 and 9.98±0.52 with sample of onion without sodium Azide and inorganic had the highest stem length values and samples of onion with Sodium Azide and inorganic had very cheap stem length. However, the leave length ranged from 29.63±0.12 and 22.45±0.10 with the Onion samples with inorganic and Organic fertilizers which had the highest leave length and sample of onion without Sodium Azide was very low leave length. The results of this study showed that each one the parameters studied within the plant were low with Sodium Azide treatment. The decrease in plant growth, plant heights, root lengths, and Phaonerogam survival, fruit yield per plant and height at maturity with agent concentration. It is hereof suggested that Sodium Azide (NaN_3) was expected to produce mutation in onion that area unit extremely liable to harmful pathogens and making them cheap to be useful for farmers.

1. Introduction

Onion (Allium cepa L.) originates from a latin word cepa which implies onions, The popularly known bulb onion is one in every of the wide consumed and cultivate vegetables of the liliid monocot genus that is closely connected with garlic, shallot, leek, chive etc. In Egypt, the bulb onion holds a crucial position among vegetable crops because of its various use as native recent consumption, in food process and exportation;

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either as recent bulbs or dehydrated slices. It is a diploid spices with 2n = sixteen chromosomes [1]. Mineral fertilizers are extremely necessary in onion growth and productivity. Several investigators have rumored that increasing the amount of NPK plant food has helped in increasing the vegetative growth and mineral uptake of onion plants.Although we have a tendency to might say continuous use of inorganic plant food might have an effect on soil structure. Hence, organic fertilizers are rumored to function different to the utilization of inorganic fertilizers for up soil structure. Abd El-Samad et al., in Egypt, investigated the result of various N fertilization rates sixty, ninety and a hundred and twenty unit N/fed as carbamide plant food. Their operations of elicited mutations in improvement of onion are verified as so much back as 1989 [2]. Four mutant varieties specifically Compas and Brunette were used for the cultivation in European country and Russia [3]. The improved characters area unit timing, stiffness and yield gift analysis paper involve the studies on elicited pigment mutations by non-particulate radiation and Na compound, alone and in combos. Since the pioneering work of Stadler (2005), pigment mutations are accustomed assess the frequencies of elicited mutations. Pigment mutations area unit necessary parameter, that area unit accustomed assess the effectiveness of the mutagens. It is additionally the indication of issue mutations. Additionally, the dearth of inbreed lines builds it troublesome to perform genetic linkage analysis in onion [4]. To analyze the likelihood of victimization elicited cause as a tool for improvement of onions, many employees [5] have worked on the potency of assorted mutagens. Most of this studies used radiation and a study of the literature clearly signify the wants of chemical mutagens sensitivity investigations in onions. Mutation created by modification in body structure, or maybe in body range is understood as alteration. The elicited mutation is caused unnaturally by agent factors. The agents that induce mutation area unit known as agent and agent in the main consists of just one agent for radiation (physical) agent. Agent does not seem to be solely helpful to form genetic variability in an exceedingly crop species, however additionally helpful and necessary for the effective management of pests throughout post-harvest storage [6]. Active of elicited mutation for crop improvement is understood as mutation breeding. Mutation breeding is one in every of the attainable alternatives to standard breeding for crop improvement. Exposing plant genetic material to mutagens enhances the prospect of isolation distinctive genetic material. Within the post elicited mutation have effectively been utilized in development of recent and valuable alternation in plant characteristics that have contributed to extend yield potentials. Gamma rays belong to radiation and in tract with atoms or molecules to supply free radicals in cells. These radicals will injury or modify necessary elements of plant cells and are rumored to have an effect on the morphological anatomy, organic chemistry and physiology of plants differentially counting on the irradiation level. These effects embody changes within the cellular structure and metabolism of the plants e.g. dilation of thylakoid membranes, alteration in chemical change, modulation of the antioxidative system and accumulation of phenoplast compounds. Hence, this study is to examine the consequences of Sodium Azide compound elicited mutation on onions full-grown with organic and inorganic plant food.

2. Methodology

The research was conducted in the Green House of the Science Laboratory Technology in The Oke Ogun Polytechnic, Saki, Oyo state. Seeds of cultivated onion was collected from the Institute of Agricultural Research (I.A.R&T), Ibadan, Oyo State. 2.6 grams of Sodium Azide pellet was weighed into the petri dish based on the calculation of the molecular mass of Sodium Azide (65) and it was mixed with 100ml of distilled water. Onion seed and tomato seed were soaked in the different biker with the mixture of Sodium Azide and distilled water and 10ml of phosphate buffer solution for 4hours and the control was soaked with ordinary distilled water and 10ml of phosphate buffer solution (the phosphate buffer solution is to reduce the acidic content of the solution). The seeds were rinsed with running water from tap water after 4 hours in order to remove excess mutagens, then the seed is air dried at room temperature for 24 hours. The treated seeds of onion were planted in plastic containers containing 4.2 g of weighed humus soil.

2.1 Data Collection

Data were obtained for seedling height, the stem length, diameter of the fruit size, the number of leaf, the PH (Potential of Hydrogen), the Nitrogen, Phosphorus, Potassium, Magnesium, Sodium, Iron, Sulphate, Calcium content.

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2.3 Seedling Height

The height of the plant per treatment was determined after two weeks of planting by holding the highest leaf erect and the height measured in centimeters.

2.4 Number of Leaves Per Plant

The number of leaf production per plant was counted and recorded for each treatment after the emergence of the first flower.

2.5 The Stem Length

The stem length was determined per treatment by measuring the stem from the emergence of the root to the first flower produced in centimeter.

2.6 Diameter of the Fruit

The fruit diameter was measured after the production of first fruit per treatment in centimeter.

2.7 Micro Nutrient in the Soil

The nitrogen, potassium, phosphorus, calcium, sulphate, sodium, iron content were determined for pre planting and post planting likewise for the control.

2.8 Data Analysis

All the data obtained was analyzed using analysis of Variance and the mean was separated using Duncan's Multiple Range Test (DMRT).

3. Results

Table 1. Mean effect of Sodium Azide Concentration on Growth Characters of Onion

	Stem Lengths	Leaf length	No of leaves	No of branches
Onion with SA & Inorganic	9.98±0.52	23.17±0.10	3.90±0.60	3.92±0.03
Onion with SA & Organic	10.68±0.52	29.63±0.12	4.83±0.71	4,83±0.05
Onion without SA & Inorganic	11.39±0.62	22.45±0.10	4.12±0.64	4.12±0.09
Onion without SA & Organic	11.25±0.62	25.10±0.10	4.06±0.64	4.06±0.04

Note: 1.Onion with SA with organic fertilizer; 2.Onion without SA with organic fertilizer; 3.Onion with SA with inorganic fertilizer; 4.Onion with SA without inorganic fertilizer

Table 2. Showing the Chemical Parameters of the sample

	1	2	3	4
Sulphate (ppm)	7.24	9.40	8.15	6.92
Calcium Ca (ppm)	10.9	2.43	1.86	0.96
Sodium Na (ppm)	1.14	0.87	1.05	0.77
Magnesium mg *100 (ppm)	2.9 Medium	6.45 Very high	0.89 Low	0.05 Very low
Iron Fe (ppm)	2.68 Low	4.93 Medium	2.32 Low	1.57 Very low
pH value	8.2 Moderate Alkaline	8.4 Moderate Alkaline	8.4 Moderate Alkaline	8.2 Moderate Alkaline

Note: 1.Onion with SA with organic fertilizer; 2.Onion without SA with organic fertilizer; 3.Onion with SA with inorganic fertilizer; 4.Onion with SA without inorganic fertilizer

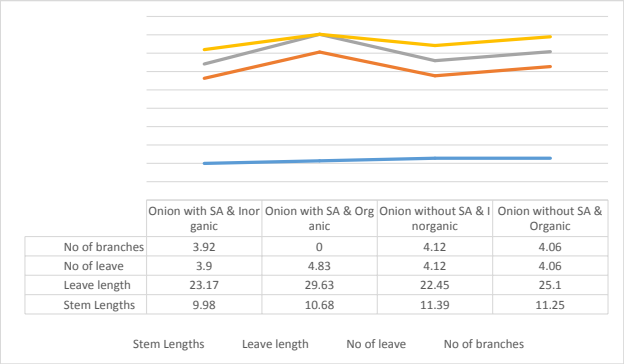

Figure 1. Mean effect of Sodium Azide Concentration on Growth Characters of Onion

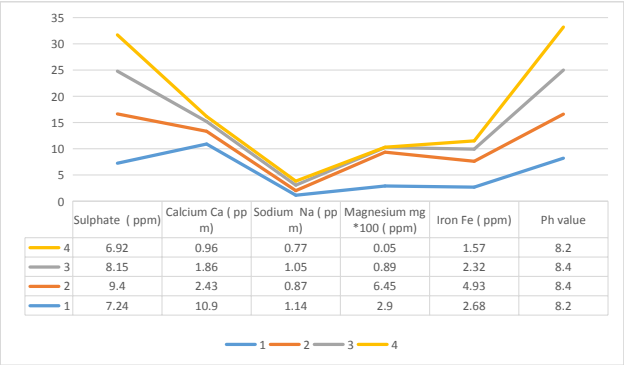

Figure 2. Showing the Chemical Parameters of the sample

4.Discussion

4.1 Mean Effect of Sodium Azide Concentration on Growth Characters of Onion

The results of this finding showed that there was variation within the rate of growth of onion with or without Sodium Azide and organic or inorganic fertilizers. The result showed that the stem length was ranged from 11.39 ± 0.62

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and 9.98 ± 0.52 with sample of onion without Sodium Azide and inorganic had the very best stem length price and sample of onion with Sodium Azide and inorganic had rock bottom stem length. However, the leave length ranged from twenty nine. 63 ± 0.12 and 22.45 ± 0.10 with sample. Onion with reserves & Organic had the very best leave length and sample of onion without Sodium Azide has rock bottom leave length. this is often compare with decrease in seed plant growth, seed plant height, length of root, and seed plant survival, height at maturity and fruit yield per plant with increasing agent concentration has been rumored in cause studies [9] once Onion was treated with Sodium Azide solution. The table one showed that range of leave ranged from four.83±0.71and 3.90±0.60 with sample of onion with Sodium Azide and organic had the very best whereas the onion with Sodium Azide & Inorganic had rock bottom number of leaves. The results of this work showed that each one of the parameters studied were stricken by sodium Azide solution. The decrease in seed plant growth, seed plant height, length of root, and seed plant survival, height at maturity and fruit yield per plant with causing with chemical agent has been rumored in case studies [9]. Similar result was obtained by Sheeba et al., once gamma rays Sasi et al., equally showed that each one plant mutant sorts registered lower yields compared to their folks within the study of the results of diethylsulphate and EMS on Okra (Abelmoschus esculentum (L.) var. MDU-1.

4.2 Chemical Analysis of the Samples

The results showed that sulphate ranged from nine.40 and 6.92 with onion with Sodium Azide with organic fertilizer (sample 2) had the very best sulphate and also the control before planting (sample 4) had rock bottom salt contents among all the samples. Calcium contents of the samples ranged from ten.9 and 0.96, onion with Sodium Azide with organic fertilizer (sample 1) had the very best calcium contents whereas control before planting (sample 4) had rock bottom metal contents within the samples. However, sodium Azide with organic fertilizer (sample1) had highest atomic number 11 contents (1.14) whereas control before planting (sample 4) had rock bottom atomic number 11 (0.77). The result more unconcealed that Mg ranged from two.9 and 0.05 with sample had low Mg whereas control before planting (sample 4) had terribly low Mg contents. Iron acts as a chemical change center for a broad spectrum of metabolic functions. Iron is additionally a part of varied tissue enzymes, like the cytochromes, that are important for energy production, and enzymes necessary for system functioning. The actual fact that humor copper has been found to be low in some cases of iron deficiency anemia suggests that iron standing has an impression on Copper metabolism [10]. However, onion with Sodium Azide with organic fertilizer (sample 1) had medium iron content whereas sample control before planting (sample 4) had terribly low iron contents. Finally, the result unconcealed the pH scale price of all the sample was not considerably distinction at moderate base-forming level. All the metal ions analyzed were gifted in variable concentrations. Numerous agencies together with World Health Organization (WHO), US Environmental Protection Agency (US-EPA) and European Restrictive Standards (EURS) have set completely different most limits for matter and macronutrient. However, on selection of mutation is more practical on the chosen traits except on survival rate, leaf range and size and pH scale wherever mutation is more practical and on range of seeds and shoot dry weight wherever treatments combination is more practical [11, 12].

5.Conclusions

The application of Sodium Azide on onion is straightforward and cheap for improvement of agronomical traits. Genetic variability is additionally vital to adapt a population to the inevitable changes within the surroundings and to market the survival of the species. The roles of mutation breeding in increasing the genetic variability quantitative traits in numerous crop plants are verified definitely. The results of this work showed that each one of the traits studied were stricken by sodium Azide treatment. The effects of radiation on onion additionally unconcealed that these traits were dose dependent. The agent effects of Sodium Azide seem presently when sowing the seeds and may be determined by naked eyes. However, Sodium Azide has been getting used in numerous crops to enhance their yield and quality traits and make resistance to them against organic phenomenon and abiotic stresses. Sodium chemical compound (NaN_3) ought to be used to produce mutation in onion plants that are extremely vulnerable for harmful pathogens and created them economically cheap and useful for farmers. Further biology and molecular researches ought to be taken on the improved onion cultivars to more clarify the genetic bases of those useful ways of improvement. Further researches ought to be embarked upon the mutants and onion to check for illness and stress tolerance.

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