PLANT BREEDERS ASSOCIATION OF NIGERIA

IN COLLABORATION WITH

Federal University of Technology, Minna

PROGRAMME OF EVENTS & BOOK OF ABSTRACT OF THE

3RD ANNUAL HYBRID CONFERENCE & AGM

"2025"

Theme

"Repositioning Plant Breeding For the Future




HOLDING AT

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

DATE

TUESDAY5TH AUGUST - FRIDAY8TH AUGUST, 2025

NATIONAL ANTHEM

Nigeria we hail thee,
Our own dear native land,
Though tribe and tongue may differ,
In brotherhood, we stand,
Nigerians all, and proud to serve
Our sovereign Motherland.
Our flag shall be a symbol
That truth and justice reign,
In peace or battle honour'd,
And this we count as gain,
To hand on to our children
A banner without stain.
O God of all creation,
Grant this our one request,
Help us to build a nation
Where no man is oppressed,
And so with peace and plenty
Nigeria may be blessed.

UNIVERSITY ANTHEM

FU- Tech Minna (2x)
We lift your name up high
Yours it is to set the pace for others
Excellence is your goal
Federal Unitech Minna Niger State
A citadel of learning
Technological advancement of our land
Is your primary goal
To build a self-reliance force
of sound mind and morals
Who will make our nation relevant in
global development
FU- Tech Minna (2x)
We lift your ag up high
The pride of Nigeria you are
And you will ever be
Our love for you won't cease

PROGRAMME OF EVENTS & BOOK OF ABSTRACT OF THE

3RD ANNUAL HYBRID CONFERENCE & AGM

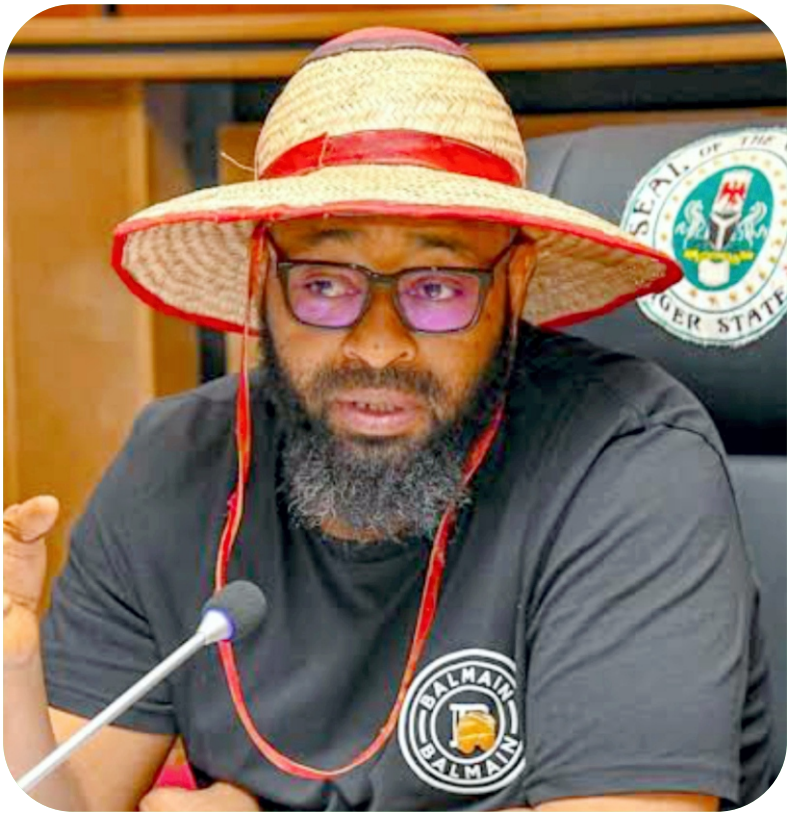
PLANT BREEDERS ASSOCIATION OF NIGERIA (PBAN)

Holding @

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE

Date

5TH TO 8TH AUGUST, 2025



His Excellency, Farmer Governor

MOHAMMED UMAR BAGO

The Executive Governor, Niger State.

Prof. Faruk Adamu Kuta
Chief Host
(Vice Chancellor, Federal University of Technology Minna)

KEYNOTE SPEAKER

DR. M. N. Ishaq,
The Executive Director,
National Cereals Research Institute, Badeggi, Niger State.

Topic: Repositioning Plant Breeding for the Future

LEAD PAPER PRESENTERS

Dr. Sangodele Emmanuel Ademola,
Chief Agronomist/ Seed System Specialist,
Olam, Nigeria

Topic: Climate Resilience in Crop Development: Breeding crops for drought resistance and climate adaptability, strategies for enhancing pest and disease resistance

Dr. Mathew Ahmed,
Permanent Secretary,
Niger State Ministry of Agriculture.

Topic: Addressing food security through improved crop varieties and the role of plant breeding in rural development and farmer livelihoods improvement in Nigeria.

Prof. Musa Dickson Achimugu,
Department of Biochemistry,
IBB Lapai, Niger State.

Topic: Integrating Artificial Intelligence in Plant Biochemistry and Breeding: A Frontier for Future -Ready Agriculture

Prof. P. C. Onyenekwe
The Director of General/CEO,
Sheda Science and Technology Complex, Abuja

Topic: Innovative Techniques in Plant Breeding: Exploring gene editing technologies such as CRISPR.
The role of biotechnology in sustainable agriculture

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PROGRAMME OF EVENTS

Time	Activities
Tuesday	Arrival

Day One: Wednesday August 6, 2025

8am-10am	Registration
10am-11:30am	Opening Ceremony
11:30-12noon	Break
12:00pm-12:30pm	First lead paper..... **Dr. Sangodele Emmanuel Ademola**-Topic: Climate Resilience in Crop Development: Breeding Crops for Drought Resistance and Climate Adaptability, Strategies for Enhancing Pest and Disease Resistance
12:30pm-1:00pm	Second lead paper..... **Dr. Mathew Ahmed**-Topic: Addressing Food Security Through Improve Crop Varieties and the Role of Plant Breeding in Rural Development and Farmer Livelihoods Improvement in Nigeria
1:00pm-1:30pm	Third lead paper..... **Prof. Musa Dickson Achimugu**-Topic: Integrated Artificial Intelligence in Plant Breeding: A Frontier for Future-Read Agriculture
1:30pm-2:00pm	Fourth lead paper.....**Prof. P. C. Onyenekwe**-Topic: Innovative Techniques in Plant Breeding: Exploring Gene Editing Technologies Such as CRISPR. The Role of Biotechnology in Sustainable Agriculture
2:00pm-2:30pm	Lunch
3:00pm-5:00pm	Technical session I

Day Two: Thursday August 7, 2025

9:00am-1:00pm	Technical session II
1:00pm-2:00pm	Lunch
2:00pm-4:00pm	Technical session III
4:00pm-5:30pm	Annual general meeting

Day Three: Friday August 8, 2025

Departure

DEVELOPMENT OF TRANSGENIC CROPS WITH PEST RESISTANCE: A STUDY ON THE TRANSFORMATION OF BLACK TURTLE BEANS (*Phaseolus vulgaris* F.) WITH A NOVEL INSECTICIDAL GENE

OKWOR Jude Ifeanyichukwu[1], ISHIWU Jecinta Chinedu[1], UGWUANYI Ikechukwu Stanley[1], AMEH Onyeke Alexander[1], OKWOR Blessing Ugochi[2] and UGWUOGO Jude Uwakwe[1]

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ABSTRACT

The black turtle beans (*Phaseolus vulgaris* F.) is a popular plant protein food widely cultivated in large quantity in agro-ecological zones of the South Eastern Nigeria and its versatility has extended beyond their traditional culinary uses. The bean leaf beetle (*Cerotoma trifurcata*) poses a significant threat to leguminous crops, particularly the black turtle beans. The destructive feeding habits of the pest result in substantial food shortage. Use of synthetic insecticides as traditional control methods, face challenges like development of resistant beetle populations, environmental contamination, and adverse effects on non-target organisms. Genetic engineering therefore offers a promising alternative, enabling the development of crops with built-in pest resistance. This study transformed black turtle beans with a novel insecticidal gene, isolated from the bacterium (*Bacillus thuringiensis*), that conferred resistance against *Cerotoma trifurcata*. The gene designated as Bt-Cry2Ae, was introduced into *Phaseolus vulgaris* using Agrobacterium-mediated transformation. The transformation protocol was optimized, and putative transgenic plants were regenerated and verified using molecular markers. The expression of the Bt-Cry2Ae gene in transgenic *Phaseolus vulgaris* crops was evaluated using quantitative real-time PCR (qRT-PCR) and enzyme-linked immunosorbent assay (ELISA). The efficacy of the transgenic *Phaseolus vulgaris* crops against the target insect pests was assessed using bioassays. The results showed that the transgenic *Phaseolus vulgaris* crops exhibited significant resistance against *Cerotoma trifurcata* with mortality rates ranging from 80% to 100%. Development of *Phaseolus vulgaris* with built-in pest resistance has reduced the reliance on insecticides and minimized environmental pollution for sustainable crop production, food security, and environmental conservation.

Keywords: Transgenic crops, Pest resistance, Transformation, Insecticidal gene and Food shortage

PHENOTYPIC DIVERSITY OF FINGER MILLET (*Eleusine coracana* (L.) GAERTN) ACCESSIONS

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ABSTRACT

Finger millet (*Eleusine coracana*), often referred to as an **orphan crop**, is a vital but underutilized cereal predominantly grown in Asia and Africa. Twenty-five finger millet accessions were evaluated at the National Cereal Research Institute Riyom, Plateau State during the 2023 cropping season with the view to determining the genetic diversity among the various accessions. The experiment was laid out in a Randomized Complete Block Design (RCBD) in three replicates and the d*ata was collected on eleven morpho-agronomic traits of finger millet. Analysis of variance, and Principal Component Analysis were used for phenotypic variance. From the result, finger millet accessions were significantly different for all the traits examined.* The PCA highlights relationships among traits, with PC1 being strongly influenced by traits like Plant Height and Panicle Length, and PC2 driven by Spike Length and Number of Spikes. A significant correlations and low p-values were exhibited in traits like Number of Tillers, Panicle Length, Plant height at maturity, and Leaf Length have significant positive correlations with Yield, making them key indicators for breeding or improving productivity. Finger millet's status as an orphan crop highlights its untapped potential. With increased research and policy attention, it could play a significant role in sustainable agriculture and global food security.

Keywords: Genetic diversity, food security, finger millet and productivity.

MOLECULAR MECHANISMS OF PLANT-PEST INTERACTIONS: A STUDY ON THE INTERACTION BETWEEN TOMATO PLANTS (*Solanum lycopersicum*) AND THE WHITEFLY PEST (*Bemisia tabaci*)

Akogwu, Hyacinth Ochenehi[1]; Okach, Isah Alamin[1]; Umar, Isiyaku Magaji[1]; Egbo, Emmanuel Ali[1]; Elendu, Chikodili Agnes[2] and Ijiga, Omale Blessing[1]

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ABSTRACT

Tomato is one of the most widely grown vegetable crops rich in vitamins. However, its production is severely threatened by insect pests. Plant-pest interactions are complex and involve multiple molecular signals and responses. Understanding these interactions at the molecular level is crucial for developing effective pest management strategies and improving crop resilience. This study unraveled the molecular mechanisms underlying the interaction between tomato plants (*Solanum lycopersicum*) and the whitefly (*Bemisia tabaci*), which is a significant global pest of tomato crops. Using a combination of molecular biology, biochemistry, and plant physiology techniques, the plant's defense response against *B. tabaci* infestation was investigated. The results showed that the plant's defense response is mediated by a complex network of signaling pathways, including the salicylic acid and jasmonic acid pathways. Several key genes were identified including those encoding pathogenesis-related proteins that play critical roles in the plant's defensive mechanism against B. tabaci invasion. Furthermore, the study revealed that the plant's defense response against *B. tabaci* is influenced by the plant's hormonal balance, particularly the salicylic acid and jasmonic acid pathways. It also demonstrated that RNA interference (RNAi)-mediated gene silencing can be used to disrupt the plant-pest interaction and enhance plant resistance against *B. tabaci*. This study provides new insights into the molecular mechanisms underlying plant-pest interactions and offers potential strategies for improving crop resilience against *B. tabaci* and other pests. These findings can be used to develop effective pest management strategies, reducing the reliance on chemical pesticides and promoting sustainable agriculture.

Keywords: Molecular mechanisms, Plant-pest interaction, Plant's defense response and Plant's hormonal balance

GENETIC VARIABILITY IN PARENTAL LINES OF MAIZE (*Zea Mays* L.)

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ABSTRACT

Seven maize parental lines were evaluated for sixteen (16) morphological characters. The experiment was laid out in a randomized block design with three replications. Analysis of variance for the genotypes for all the characters was highly significant ($p < 0.01$) except days to 50% tasselling, days to 50% silking, 100-grain weight, shelling %, and harvest index. However, a significant difference ($p < 0.05$) was observed in the Anthesis-silking interval (ASI) and days to 50% maturity. High (>60%) to moderate (30-60%) broad sense heritability was observed in most of the characters while Days to 50% tasseling and Days to 50% silking exhibited low (< 30%), heritability of 3.61% and 1.33% respectively. The highest values for the Phenotypic coefficient of variation (PCV) and Genotypic coefficient of variation, (GCV) of 188.89% and 124.44% respectively were recorded in ASI. Yield and yield components recorded high values. The cluster divided parental lines into four clusters at the dissimilarity coefficient of 0.68. In the Principal Component Analysis (PCA), the first two principals accounted for 59.80. However, PCA1 and PCA2 accounted for 37.04% and 22.76% respectively. The correlation coefficient shows a highly significant positive phenotypic correlation between yield/ha, and all growth and yield parameters.

Keywords: Genetic gain, genotypic coefficient of variation, phenotypic coefficient of variation, heritability, open-pollinated varieties

EFFECT OF RATES AND METHODS OF LIME APPLICATION ON THE YIELD ATTRIBUTES OF GROUNDNUT (*Arachis hypogea* L.) VARIETIES IN THE SUDAN SAVANNA ZONE OF NIGERIA.

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ABSTRACT

Two field trials were conducted during the wet season of 2017 at Bagauda (latitude 11^0-22^0N and longitude 180^0-22^0 E) and 500 m above the sea level. The soil of the experimental site are well drained sandy loam and Aliko Dangote University of Science and Technology, Wudil Teaching and Research Farm located at Gaya (latitude 11^o-14^o N and longitude 738 -803 E), 475m above the sea level both located in Sudan Savannah of Nigeria to study the effect of rates and methods of lime application on the growth attributes of groundnut (*Arachis hypogea* L.) Varieties. The treatment tested consist of four varieties of groundnut (Samnut -21, Samnut-22, Samnut-23, Samnut-24), four rate of lime (0kg, 2kg, 4kg, 6kg/ha) and two method of lime application (soil and foliar) which were laid out in split plot design with three replications during 2017 wet season. The combination of method of lime application and groundnut varieties were in the main plot while rate of lime in the sub plot respectively. Lime was first incorporated in to the soil as soil application at one week before sowing while foliar application of lime was carried out at six weeks after planting in both two locations. The result of the study reveal that groundnut planted at bagauda was significantly higher in most of the growth component than that of gaya location Samnut- 24 produced the highest number of plants, mature pods plant^{-1} and flowers earlier but was comparable to Samnut-22 in emergence count and count respectively. It could be concluded that higher vegetative growth of Groundnut was found soil applied lime

Keywords: Groundnut, Lime and Varieties

GENE ACTION AND COMBINING ABLITY FOR YIELD AND YIELD COMPONENTS OF SELECTED MAIZE GENOTYPES UNDER LOW NITROGEN

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ABSTRACT

Low soil Nitrogen (low N) is an abiotic stress factor that limits grain yield performance of maize, causing remarkable grain yield losses, varying from 10 to 90% (Victor *et al*., 2013 and Badu-Apraku *et al*., 2015). Nitrogen stress (Low N) is caused by several factors, including population pressure on land and poverty. Line x Tester mating design of Kempthorn (1952) was employed in this study to generate 80 progenies of maize and six checks for evaluation in an 8 x 11α lattice design under stem borer infested and low N conditions in four locations, with the objectives of estimating Combining Ability, Yield Performance, Stability Status of selected maize genotypes across test environments and determine the Gene Action conditioning the inheritance of Resistance to Stem Borer and Low nitrogen of stem borer inbred maize lines for breeding of maize hybrid for low income farmers. The result revealed that both additive and non-additive gene action were important in controlling grain yield, days to anthesis and all borer traits under low N and stem borer infestation with non-additive gene action controlling these traits. The hybrids (2, 20, 26, 69, 18 and 19) were outstanding in yield and stability and hence, their parents should be used for commercial production of hybrids for farmers.

Keywords: combining ability, yield, gene action, stem borer and low nitrogen, IITA

MORPHOMETRIC ANALYSIS OF VEGETATIVE TRAITS IN SOME BAMBARA GROUNDNUT (*Vigna subterranean*) ACCESSIONS

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ABSTRACT

Morphometric analysis of vegetative traits in Bambara Groundnut Accessions are necessary for maintenance of genetic stock and development of improved varieties. This study was aimed at determining morphometric analysis responsible for variation among thirty Bambara groundnut accessions. This experiment was carried out at the Teaching and Research Farm of the Federal University of Technology, Akure. Thirty accessions of Bambara groundnut landraces were obtained from the Gene bank of IITA, Ibadan and six states in Northern Nigeria, namely: Bauchi. Benue, Borno, Kebbi, Kogi and Plateau. Data were collected for plant height, number of leaves, flower emergence, spread per plant, petiole length, pedicle length, terminal leaf length, terminal leaf width and it's subjected to analysis of variance (ANOVA) using Minitab version 7.0. Significant means ($P \leq 0.05$) were separated using Tukey HSD. There was a significant correlation between plant height, number of leaves, lower emergence, petiole length, peduncle length, terminal leaf length and terminal leaf width This implies that more study needs to be carried out to understand the traits that is associate with improved yield and yield components in Bambara groundnut cultivated in Nigeria. Number of leaves were the most heritable traits as obtained from the result of this study.

Keywords: Bambara, morphometric, accession

AMMI ANALYSIS FOR GRAIN YIELD OF TWENTY – FIVE (25) GENOTYPES OF SOYBEAN [*Glycine Max (*L.) Merrill]

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ABSTRACT

The demand for soybean grain is high due to its usage as food supplement for man, essential constituent of poultry feed and as raw material in food industries. Despite its utilization in home and industries, supply does not meet market demand in Nigeria especially, in the Southwest region. Adequate production of soybean [*Glycine max* (L.) Merrill] in Nigeria depends on selection of varieties combining high grain yield with stability. Soybean genotypes (23) and two landraces were therefore evaluated in three environments: Abeokuta, Ibadan upland and Ibadan in - land valley to select desirable genotypes that combine high yield and stability. The soybean seeds were planted in each of the environments using randomized complete block design (RCBD) with three replicates. Data were taken on soybean grain yield and yield components. AMMI model was employed to analyse grain yield so as to select desirable genotypes for grain yield and stability. Genotype TGX 2027-3E was identified as the best that combined high yield (37.70 g / plot) and stability; genotypes TGX 2016-2E, TGX 2007-4F, TGX 2029-1F and TGX 2027-4E were also identified as having good potential in this regard. The three tested environments were diverse as the genotypes reacted differently in each environment; hence no

mega nvironment was established. The study concluded that genotypes TGX 2027-3E, TGX 2016-2E, TGX 2007-4F, TGX 2029-1F and TGX 2027-4E would be desirable for cultivation across the three environments. AMMI model was indicated as a good and adequate stability tool for selection of desirable genotypes for grain yield and stability in this study. Therefore, genotypes TGX 2027-3E, TGX 2016-2E, TGX 2007-4F, TGX 2029-1F and TGX 2027-4E that combined high yield and stability could be recommended to growers in the trial (or similar) environments.

Keywords: Adaptability, stability, genotype, grain yield

PERFORMANCE OF SOYBEAN (*Glycine max* (L.) *MERRIL*) GENOTYPES IN MINNA, NIGER STATE

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ABSTRACT

The experiment was conducted at the Teaching and Research Farm of the School of Agriculture and Agricultural Technology, Federal University of Technology, Minna, Niger State, Nigeria. The treatments were four soybean genotypes arranged in randomized complete block design. Data were collected on emergence percentage, plant height, number of leaves per plant, biomass weight, grain weight per plot, 100 seed yield. Data collected were subjected to analysis of variance and means were separated using Least Significant Difference (LSD) at 5 percent level of probability. Results indicated that Genotype NCRI SOY AC- 29 recorded significantly higher emergence percentage (91.07), plant height (26.69) and grain weight per plant (96.97g). Genotype NCRI SOY AC- 29 (47.00a) also attained the height number of leaves per plant but not significantly different to TGx 1835 –10E (46.00ab). Genotype NCRI SOY AC-78 (1.02kg) recorded the heaviest biomass weight and heaviest in the 100 seed weight (7.79kg). The results of the experiment show that three soybean genotypes; NCRI SOY AC- 29, TGx 1835 –10E and NCRI SOY AC-78 performed better than the other as they trend to improve in emergence percentage, plant height, grain weight per plant, number of leaves per plant, biomass weight and 100 seed weight. Therefore, NCRI SOY AC – 78 could be recommended to farmers for the heaviest biomass weight performance among others.

Keywords: Genotypes, Performance, Soybean

PHENOTYPIC STABILITY AND DROUGHT TOLERANCE EVAL UATION OF F_1 TOMATO HYBRIDS DERIVED FROM LINE × TESTER CROSSES USING AMMI, GGE BIPLOT, BLUES, AND PCA MODELS: A REVIEW

Simon Simeon Jatutu[1*]; V.T Tame[1]; Kamaludden Meshegu[1]; Chukwu, Chidiebere[2]; Peter Abraham [2]; Oluro Christopher Ojo [2]; Ijemere Stella Chinonye[3]; Sawa Fatima B.J [4]; S.D Abdul[4]

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ABSTRACT

Tomato (*Solanum lycopersicum* L.) is a crop of universal interest but is mostly hindered by abiotic stress, especially drought. It is crucial in sustainable agriculture to create hybrids that are tolerant to drought and exhibit uniform phenotypic behavior. This review assesses the use of high-level statistical models such as Additive Main Effects and Multiplicative Interaction (AMMI), Genotype and Genotype × Environment (GGE) Biplot, Best Linear Unbiased Estimates (BLUES), and Principal Component Analysis (PCA) in the phenotypic stability and drought tolerance estimation of F1 tomato hybrids derived from line × tester crosses. Recent research emphasizes the utility of these models in the detection of better genotypes, description of genotype × environment interactions (GEI), and breeding strategy optimization for drought tolerance. Integration of these models offers a solid platform for enhancing tomato breeding programs under fluctuating climatic conditions.

Keywords: Tomato breeding, drought tolerance, phenotypic stability, AMMI, GGE Biplot, BLUES, PCA, genotype × environment interaction, F1 hybrids, line × tester crosses

ENETIC STUDIES ON SEED (GRAIN) YIELD IN WILD X LANDRACE COWPEAS GROWN IN BAUCHI NORTHERN GUINEA AGROECOLOGY IN NIGERIA

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ABSTRACT

Genetic studies are carried out to determine the manner and ways in which desirable characters are passed from parents to offspring and how these could be used in upgrading crop yield. Screen house and field evaluation studies involving landrace cowpeas and their wild relative (Dekindtiana *var. pubescens*) were carried out in Tafawa Balewa and Bar Arewa in Bauchi State, Nigeria, to study the inheritance of seed (grain) yield in Wild x Landrace cowpeas. 30 genotypes, comprising 10 parents, nine F_1, two backcrosses and nine F_2 were advanced from collection and hybridization trials. These were laid out for evaluation in a randomized complete block design with three replications in the wet season of 2018. The parental genotypes bred true to type in all the seed characteristics studied. Number of seeds, one-hundred seed weight and seed yield per plant in the parents, F_1, backcrosses and F_2 differed significantly ($p< 0.05$). Heterosis was observed in all the crosses on seed yield per plant and seed yield per hectare in the F_1. There was inbreeding depression on most of the seed yield parameters observed in the F_2. However, some plants were observed with similar seed yield per plant and seed yield per hectare with their F_1 in all the crosses. This suggests that great potential exists for the improvement of seed yield in cowpea via appropriate selection, especially, when landraces and their wild relatives such as Dekindtiana *var. pubescens* are used.

Keywords: Inheritance, yield, wild, landrace and cowpea.

EVALUATION OF BENISEED GENOTYPES FOR RESISTANCE TO COWPEA APHID-BORNE MOSAIC VIRUS

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ABSTRACT

Beniseed (*Sesamum indicum*) is a significant legume crop in tropical and subtropical Africa, but viral infections, particularly *Cowpea aphid-borne mosaic virus* (CABMV), significantly reduce its yield. This study aimed to identify resistant genotypes to CABMV among beniseed genotypes from the germplasm of the National Cereals Research Institute (NCRI), Badeggi, Nigeria. The experiment was conducted in a screenhouse at the Federal University of Technology, Minna, using eleven genotypes in a completely randomised design with two replications. Each genotype was evaluated under CABMV-infected and control conditions. Plants were sap-inoculated with CABMV 4 weeks after sowing. Disease incidence and severity and growth and yield parameters were recorded. Data were analysed using ANOVA at a significance level of $p \leq 0.05$. Student-Newman-Keuls was used to separate means of disease incidence and severity, while the least significant difference (LSD) was applied to compare growth and yield traits. Two weeks after inoculation, inoculated plants had no significant differences in disease incidence. However, genotype NG/MNL 008 showed significantly ($p<0.05$) lowest disease severity (score = 2.2) and superior agronomic traits: highest number of leaves (14), pods per plant (2), pod diameter (0.60 cm), pod length (1.70 cm), and seeds per pod (24). These results suggest that NG/MNL 008 was the most tolerant to CABMV and holds promise as a potential genetic resource for resistance breeding in beniseed.

Keywords: CABMV; beniseeds; genotypes; growth parameters; yield

VARIABILITY AND AGRONOMIC PERFORMANCE OF RICE (*Oryza sativa*) ACCESSIONS IN MAKURDI, NIGERIA

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ABSTRACT

A field experiment was carried out at the Teaching and Research farm of Joseph Sarwuan Tarka University, Makurdi in 2023 cropping season to access variability and agronomic performance for yield and yield related traits of accessions of rice for possible further breeding and commercial utilization. The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. Data was collected for the following parameters; plant height, tillering number, panicle exertion, leaf length, panicle length, days to 50% flowering, spikelet number, number of seed per panicle, grain yield, panicle number. The results showed significant differences among the breeding lines evaluated for all traits studied. G3 which produced the highest seed yield (134.8g) was found to produce the highest number of seeds per panicle (217.7 seeds) as well as significant longer leaves (37.67 cm). Thus, higher seed yield and increased number of seeds per panicle might be attributed to longer leaf which makes for increase photosynthetic ability. Phenotypic variance was higher than the genotypic variance for all the characters indicating the influence of the environmental factors on these traits. Number of seed per panicle and panicle exertion recorded medium heritability estimates, which suggests these characters were primarily under genetic control and selection for them could be achieve through their phenotypic performance.

Keywords: Rice, Evaluation, Grain Yield, Variability, Heritability, Genetic Advance

HETEROSIS FOR GRAIN YIELD AND YIELD COMPONENTS OF BREAD WHEAT (*Triticum aestivum* L.) IN SUDAN SAVANNA ZONE OF NIGERIA

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ABSTRACT

This study quantified heterosis in F_1 hybrids of bread wheat under Sudan savanna conditions. Six wheat varieties (Reyna 15, Reyna 28, Borlaug 100, Crow S, Imam, Altar 84) were crossed in a partial diallel to produce 15 F_1's. Parents and crosses were grown in multi-location trials, and mid-parent and better-parent heterosis were estimated for grain yield and yield-component traits. Many crosses exhibited positive mid-parent heterosis for traits like establishment count, plant height, spikelet number, and grain yield. Notably, the hybrid Reyna 15×Altar 84 showed high positive heterosis for grain yield and plant height. Several hybrids significantly exceeded their better parent in performance, demonstrating useful heterosis. The patterns suggest that both dominance and overdominance gene action contribute to yield heterosis. The identified high-heterosis crosses (e.g. Reyna15×Altar84, Reyna15×Borlaug100) also had high SCA, underscoring their breeding value. These results imply potential for exploiting heterosis in wheat breeding, either via hybrid development (if feasible) or through use of these crosses to capture transgressive segregants.

Keywords: Heterosis, Yield, Dominance

COMBINING ABILITY AND GENE ACTION FOR YIELD AND YIELD COMPONENTS OF BREAD WHEAT (*Triticum aestivum* L.) IN SUDAN SAVANNA ZONE OF NIGERIA

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ABSTRACT

A partial diallel study was conducted on six bread wheat (*Triticum aestivum* L.) varieties and their F_1 hybrids to assess the combining ability and gene action under Sudan savanna conditions in Nigeria. The 6×6 half-diallel cross involved parents (Reyna 15, Reyna 28, Borlaug 100, Crow S, Imam, and Altar 84) and 15 F_1 crosses. All 21 genotypes (parents and crosses) were evaluated in a Randomized Complete Block Design (RCBD) at Maiduguri and Hadejia (Lake Chad Research Institute sub-station) during the 2023/2024 dry season. Analysis of variance showed highly significant genotype differences for most traits, indicating substantial genetic variability. Combining ability analysis revealed that both general (GCA) and specific combining ability (SCA) variances were significant for key traits, reflecting the influence of additive and non-additive gene action. GCA effects for grain yield and plant height were notably high in varieties Reyna 15 and Borlaug 100, identifying them as superior parents. Crosses such as Reyna 15×Borlaug 100 and Altar 84×Crow S exhibited significant positive SCA for yield components. The GCA/SCA ratio exceeded unity for most traits, suggesting predominance of additive gene action. These results imply that selection of parents with strong GCA (e.g. Reyna 15, Borlaug 100) and exploitation of specific hybrids (e.g. Reyna 15×Borlaug 100) could effectively improve wheat yield.

Keywords: Combining ability, Yield, Genotype

ROLE OF EPISTATIC GENE ACTION IN INHERITANCE OF OIL QUALITY TRAITS IN SESAME (*Sesamum Indicum* L.)

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ABSTRACT

The steady demand for more edible plant oils has urged scientists to explore the genetic basis of oil biosynthesis and a high oil yield in crops. Improving productivity of sesame crop is vital to harness the nutritional and medicinal properties of the crop. This can be best achieved through genetic improvement of the crop. The study was conducted using six populations (P_1, P_2, F_1, F_2, BC_1 and BC_2) resulting from four different crosses (Ex-Sudan x Yandev 55, Ex-Sudan x 530-6-1, E8 x Yandev 55 and E8 x 530-6-1) which were evaluated to determine the mode of gene action and identify epistatsis for oil quality traits in sesame. The results revealed that the four crosses exhibited both additive and additive x additive interactions for oil quality traits, indicating predominant role of dominance gene effects in the inheritance of oil quality traits, with duplicate epistasis being more dominant than complementary epistatsis. Duplicate epistasis were found in all traits except acid value and saponification value in cross III (E8 x Yandev 55), oleic acid in cross I (Ex-Sudan x Yandev 55) and stearic acid in cross II (Ex-Sudan x 530-6-1) that revealed complementary epistasis. Low to moderate narrow sense heritability estimates were recorded for all the traits studied except cross I (Ex-Sudan x Yandev 55) that showed high narrow sense heritability estimate of 67.00% for iodine value. The Low heritability estimates observed in this study indicate the difficulty in improving these characters, which might be under estimated because of high intra plant variation of individual plants in F_2 generation.

Keywords: Gene, Inheritance, Traits, Epistatsis

HERITABILITY AND GENETIC ADVANCE IN CHILLI PEPPER (*Capsicum Annuum)* LANDRACES FOR BREEDING INNOVATION

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ABSTRACT

Capsicum annuum L. is a member of the Solanaceae family. It is the second most consumed vegetable globally, yet the genetic potential of its landraces remains underutilized in breeding programs. This study investigates the genetic variability, heritability, and genetic advance of key agronomic traits in ten chilli pepper landraces, aiming to provide a foundation for breeding innovation and sustainable cultivar development. Significant differences were observed among genotypes for traits such as plant height, fruit length, fruit width, and number of fruits per plant, indicating the presence of ample genetic variability. High heritability values for these traits suggest predominant additive gene action and their suitability for direct phenotypic selection. Notably, FUNAAB 017 exhibited early flowering and the longest fruits, while FUNAAB 015 recorded the widest fruits, highlighting their breeding value. Based on trait performance and heritability estimates, FUNAAB 020 (fruit number), FUNAAB 014 (fruit weight), FUNAAB 017 (earliness and fruit length), and FUNAAB 012 (plant height) are recommended as promising parental lines for hybridization or advancement through pure-line selection. Traits with high heritability and genetic advance, such as fruit number and plant height, should be prioritized for early-generation selection, whereas traits with low heritability like pedicel length require delayed selection. A multi-trait selection strategy incorporating earliness, yield, and fruit size is advised for enhanced performance and market suitability. To strengthen the use of these landraces in breeding pipelines, further research on genotype stability and adaptability across environments through multi-location and multi-season trials is recommended.

Keywords: *Capsicum annuum,* Heritability, Genetic Variability, Landraces.

INHERITANCE OF GRAIN YIELD AND YIELD PARAMETERS IN RICE (*Oryza Sativa* L.) USING PARTIAL DIALLEL MATING ANALYSIS

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ABSTRACT

A study on the Inheritance of grain yield and yield parameters in rice using partial diallel mating analysis was carried out at the National Cereal Research Institute (NCRI), Badeggi, Bida, Niger State. The planting materials used in this experiment include a variety of new Africa Rice (NERICA 1 also known as FARO 55) and four varieties of other FARO rice (FARO 41, 47, 63 and 64). Planting materials were crossed according to a partial diallel mating analysis. Parent lines and F_1 hybrids were evaluated, individual and joint analyses of variance were performed, the result obtained from the analysis of variance for the parameters analyzed showed that there was a high significant difference at the parent line and the Specific Combining Ability (SCA) for the parameters observed at ($P<0.05$) and least significance at the General Combining Ability (GCA) and replication on the side of plant height at harvest and panicle count at replication at ($P<0.05$). However, Heritability in narrow sense was observed to be high in all studied trait from 0.82% to 0.98%. The crosses between FARO 41 x FARO 47 and FARO 47 x FARO 63 were identified as the most promising F_1 for breeding programmes for higher grain yield. Therefore, can be recommended to farmers for high grain yield.

Keywords: Partial Diallel, Mating, FARO 41, FARO 47, FARO 55, FARO 63, and FARO 64.

ASSESMENT OF FIBER QUALITY OF SOME UPLAND COTTON GENOTYPES IN NORTH CENTRAL NIGERIA

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ABSTRACT

This study was conducted to evaluate the fiber quality traits of selected cotton genotypes cultivated in North Central Nigeria, with the aim of identifying superior lines for enhanced textile performance. Key fiber parameters assessed included spinability index, fiber strength, length uniformity, fineness, maturity, and upper half mean length (UHML). Results revealed that **Samcot 11** exhibited the highest spinability index (152.25), length uniformity (86.58%), and fiber strength (29.08 $kNmkg^{-1}$), indicating its potential for high-quality yarn production. **Samcot 10** recorded the highest fiber fineness (4.38), while **Samcot 12** had the lowest fiber maturity value (0.85%). All other genotypes displayed relatively uniform maturity values (0.86%) with no significant differences. However, UHML values across all genotypes were below 21 mm, reflecting generally short fiber lengths. The findings highlight **Samcot 11** as the most promising genotype in terms of overall fiber quality, suitable for further development and utilization in cotton improvement programs in the region.

Keywords: Quality, Genotypes, Fiber

DIVERSITY IN PHYTOCHEMICAL COMPOSITION OF *Moringa Oleifera* LEAVES: INSIGHTS FROM NORTHERN NIGERIA ACCESSIONS

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ABSTRACT

This study investigated the phytochemical composition of various accessions of *Moringa oleifera* leaves collected from different regions in Nigeria, aiming to evaluate their potential medicinal and nutritional significance. Phytochemical screening revealed the presence of lavonoids, alkaloids, phytates, oxalates, hydrogen cyanide, and tannins in all accessions, although concentrations varied significantly among samples. The highest flavonoid content was observed in accession NGR-NSR-09 (13.22 g/100g), while NGR-FCT-05 exhibited the lowest (4.49 g/100g). Alkaloid concentrations ranged from 3.96 g/100g in NGR-YOB-32 to 11.52 g/100g in NGR-NG-03. Phytate content varied between 1.50 g/100g and 4.14 g/100g, with NGR-KN-21 recording the highest level. Oxalate levels ranged from 1.74 mg in NGR-ZFR-14 to 4.92 mg in NGR-SOK-36. Hydrogen cyanide content showed considerable variation, with the highest value in NGR-BEN-31 (1801.17 ppm) and the lowest in NGR-SOK-35 (73.08 ppm). Tannin content varied between 0.70% and 2.55%. These findings are consistent with previous studies reporting similar phytochemical ranges in *M. oleifera* and highlight the species' potential as a raw material for pharmaceutical and nutraceutical applications. The significant variation among accessions underscores the genetic diversity of *M. oleifera*, suggesting potential for selective breeding to enhance desirable phytochemical traits. High flavonoid and alkaloid contents in some accessions may contribute to antioxidative and antihypertensive properties, while tannins, phytates, and other constituents indicate potential therapeutic applications against infections, oxidative stress, and chronic diseases. Overall, *M. oleifera* demonstrates considerable promise for use in herbal medicine and the pharmaceutical industry.

Keywords: accessions, phytochemical screening, Nutritional Significance

FARMERS' PERCEPTION TOWARDS THE ADOPTION OF GENETICALLY MODIFIED CROPS IN KOGI AND NIGER STATES, NIGERIA

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ABSTRACT

This study investigated farmers' perceptions toward the adoption of genetically modified (GM) crops in Kogi and Niger States, Nigeria—two agriculturally active regions in the country. Despite the growing interest in biotechnology and the introduction of GM crops such as Bt cotton and pod borer-resistant cowpea, their adoption by smallholder farmers remains limited due to a mix of knowledge gaps, socio-cultural beliefs, and institutional barriers. Using a descriptive survey design, 160 crop farmers were randomly selected across eight farming communities in Adavi and Lokoja LGAs (Kogi State), and Bosso and Chanchaga LGAs (Niger State). Data were collected via structured questionnaires and oral interviews, and analyzed using descriptive statistics and binary logistic regression. The findings showed that 65% of respondents had heard of GM crops, but only 30.8% could correctly define them, indicating a significant gap between awareness and understanding. Farmers generally agreed that GM crops could enhance yield, reduce pesticide use, and improve pest resistance. However, many expressed concern about health and environmental risks. Key determinants of adoption included education level, farm size, access to extension services, awareness, and trust in GM technology, while age negatively influenced adoption likelihood. Constraints identified included high seed costs, poor access, cultural and religious concerns, insufficient information, and weak government support. The study concludes that while farmers in Kogi and Niger States show cautious optimism about GM crops, adoption is hindered by structural, informational, and perceptual challenges. It recommends enhanced farmer education through localized extension services, media campaigns, and policy support to ensure the responsible and equitable spread of GM technologies in Nigeria.

Keywords: Genetically Modified Crops, Farmer Perception, Adoption, Awareness, Constraints

GENETIC VARIABILITY, HERITABILITY AND CORRELATION IN SELECTED FOOD QUALITY ATTRIBUTES IN WHITE YAM (*Dioscorea Rotundata*)

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ABSTRACT

Yield parameters and food product quality are important factors in selecting yam varieties for cultivation. Among its various food products, boiled and pounded yam stands out as traditional dishes with significant cultural, nutritional, and sensory importance in regions where yam is a staple food. This study evaluated the starch content, sensory properties, and textural attributes of boiled and pounded yam products derived from 25 white yam (Dioscorea rotundata) genotypes cultivated across six environments. The yam samples were cooked and pounded using a QASA machine. Sensory quality assessments were conducted for both boiled and pounded yam through sensory evaluation, while instrument-based textural profile analysis was performed exclusively on pounded yam. A significant ($P<0.001$) positive correlation was observed among the measured traits. A total of 18 traits, categorized into boiled, pounded, and instrument-based assay groups, were assessed. Broad-sense heritability (H^2) estimates ranged from 20% (chewiness) to 75% (hardness). Sensory traits exhibited heritability estimates between 34% and 64%, while instrument-based assay traits ranged from 20% to 75%, indicating good potential for genetic improvement. The identified heritable traits enhance the feasibility of genetic improvement, and improving traits such as appearance and mouldability is likely to result in simultaneous improvements in other traits.

Keywords*:* Genetic variability, Principal component analysis (PCA), Instrument-based assay, yam

EFFECT OF INTER ROW SPACING ON GROWTH AND YIELD OF ROSSELE (*Hibiscus Sabdariffa* L.) VARIETIES IN SUDAN SAVANNA ZONES OF KEBBI STATE, NIGERIA

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ABSTRACT

Roselle (Hibiscus sabdariffa L.), an economically significant crop known for its edible calyces, but faces yield constraints in Nigeria's savanna due to sub optimal agronomic practices, particularly spacing and variety selection. A field experiment was conducted during the 2023/2024 dry season at Kebbi State University of Science and Technology Aliero, to evaluate the effects of intra-row spacings and variety on yield parameters of roselle (Hibiscus sabdariffa L.) in Sudan Savanna zones of Kebbi State, Nigeria. Three inter-row spacing's (30 x 50 cm, 45 x 50 cm, and 60 x 50 cm) and three varieties (NHBR V1, NHBR V2, and NHBR V3) were tested in a Randomized Complete Block Design (RCBD) with three replications during the 2023/2024 dry season...Data on fresh and dry weights of fruits, leaves, calyces, and seeds were analyzed using ANOVA and Duncan's Multiple Range Test (DMRT). Results showed that wider spacing (60×50 cm) produced significantly higher fresh fruit weight (555.12 g), while variety NHBR 3 outperformed others in calyx yield (214.67 g fresh weight) and leaf yield. Oven dry weights also varied significantly among varieties, with NHBR 2 producing the highest dry leaf weight. Interactions between spacing and variety were mostly non-significant. The findings suggest that NHBR 3 at wider spacing offers the best potential for optimizing calyx yield in the Sudan savanna zone.

Keywords; Varieties, Rossele, Sudan Savanna

GENETIC VARIABILITY, HERITABILITY AND GENETIC ADVANCE OF SOME SUGARCANE TRAITS IN NATIONAL CEREALS RESEARCH INSTITUTE, BADEGGI, NIGERIA

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ABSTRACT

There is need for continuous improvement of sugarcane crop to evolve new varieties for substitution of low yielding diseased susceptible varieties by high yielding resistant clones to increase sugar production in Nigeria. A study was conducted on 35 sugarcane accessions at NCRI Badeggi. The sugarcane accessions were planted on Randomized Complete Block Design (RCBD) with three replications at sugarcane field. The phenotypic and genotypic variances for every character were estimated from the analysis of variance. Higher GCV and PCV values were recorded for sprout count (30.7/43.8), Tillering (42.3/54.8), Millable stalk (47.52/56.39) and yield (33.9/50.5). Most other traits showed moderate values except for the low GCV recorded for Brix. Only millable stalk (82.5 %) was distinguished in terms of genetic advance of mean, while brix (15.1 %) and plant height at 6 months were relatively low. This study has demonstrated that sprout count, number of tillers, number of milleable stalk and cane yield recorded high GAM coupled with high heritability, GCV and PCV which is an indication that selection would be good for improvement of those traits.

Keywords: Variability, Accessions, Sugarcane, Phenotypic, Genotypic

EFFECTS OF DROUGHT STRESS ON STRATEGIC YIELD COMPONENTS OF MAIZE (*Zea Mays L.)* CROP

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ABSTRACT

Water stress is an abiotic condition that significantly reduces maize production. Thirty maize hybrids were planted in a randomized complete block design (RCBD), replicated three times under water stress and non-stress conditions at separate locations (Adunu, longitude 7°91 E, latitude 9°351 N, and Jebba, longitude 4°511 E, latitude 9°71 N). Seven yield components were investigated in this study. The combined data revealed substantial variations between hybrids for 100-grain weight, cob length, cob diameter, number of grains per row, number of grains per cob row, and number of grains per cob under water stress and non-stress conditions. The correlation matrix reveals a positive and substantial relationship between grain yield and weight of 100 grains, number of grains per cob, number of grain rows per cob, cob length, cob diameter, and the total number of grains per cob. As a result, these yield characteristics offered the most significant input for increasing grain production under drought stress conditions. Under both conditions, the grain yield and other significant yield components were found to be superior with the hybrids (W. DT STR Syn/TZL COMP1-W) F2 X DT SYN2-W F1 and DT Syn-1 F2 X TZL COMP1-W C6/DT-SYN-1-W. Therefore, it is advised that these lines be used to further enhance the maize production.

Keywords: Drought, Stress, Yield

MACHINE LEARNING-ENHANCED GENOMIC PREDICTION FOR YIELD, NUTRITION, AND FALL ARMYWORM RESISTANCE IN EXTRA-EARLY PROVITAMIN A QUALITY PROTEIN MAIZE

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ABSTRACT

Fall armyworm (FAW) is a major threat to maize production in sub-Saharan Africa. This study evaluated extra-early maturing provitamin A quality protein maize (PVA-QPM) inbred lines for grain yield, nutritional quality, and FAW resistance, integrating genomic prediction and SNP discovery to support breeding. Trials were conducted in Oke-Oyi, Nigeria, during 2023 and 2024. Inbreds TZEEIOR 205 and 202 outperformed commercial checks in grain yield. Substantial variation was observed for FAW resistance traits: leaf damage (2.5–6.0), larval count (5.0–13.5), dead heart (6–30%), and ear damage (1.6–5.0). Nutritional traits also varied: β-carotene (2.5–24.0 µg/g) and tryptophan (0.06–0.11%). Grain yield showed negative correlations with FAW traits ($r = -0.55$ to -0.62), while β-carotene and tryptophan were positively associated ($r = 0.40–0.42$). Deep learning and gradient boosting provided the highest genomic prediction accuracies ($r = 0.63–0.65$). Genome-wide SNP analysis identified resistance-associated loci, including genes for lipoxygenase, WRKY transcription factors, and phenylalanine ammonia-lyase, along with novel markers. Findings confirm the polygenic nature of FAW resistance and highlight the potential of combining phenotypic and genomic tools to accelerate development of nutrient-rich, FAW-resistant maize for sub-Saharan Africa.

Keywords: Heritability, selection, gradient boosting, correlations, single nucleotide polymorphism

PHYSIOLOGICAL RESPONSE OF PEPPER SEEDS TO DIFERRENT DRYING METHODS

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ABSTRACT

Pepper (*Capsicum* spp.), a member of the Solanaceae family, is a globally cultivated crop with its center of diversification in Brazil. Although the genus comprises 36 species, only five (*Capsicum annuum, C. chinense, C. frutescens, C. pubescens,* and *C. baccatum*) are widely cultivated. Known for their pungency due to capsaicinoids, peppers are in high demand, necessitating improved seed production practices. Seed drying is a critical postharvest process, significantly affects seed quality, germination, and longevity. Therefore, adopting suitable drying methods is essential for enhancing pepper seed performance and ensuring successful cultivation. This study aimed to evaluate the effects of different seed drying methods on the growth and yield of pepper. The experiment was conducted in the screen house of the Centre of Excellence in Agricultural Development and Sustainable Environment (CEADESE) at the Federal University of Agriculture, Abeokuta (FUNAAB). Seeds extracted from freshly harvested pepper fruits were subjected to three drying methods: sun drying, shade drying, and screen house drying. Parameters recorded were germination percentage, plant height, number of leaves, and seedling vigour index. Data collected were subjected to Analysis of Variance using 12th edition of GenStat. Findings from the study underscore the importance of the drying method in determining seed quality. Sun drying produced the best results in terms of seed performance for immediate planting. Thus, sun drying is recommended as the most effective method for pepper seed drying to ensure high-quality seed production and improved crop establishment.

Keywords: Pepper, Seed, Drying methods, Germination percentage and Seedling Vigour.

EFFECT OF SEED NUMBER PER POD ON GROWTH CHARACTERISTICS AND YIELD INDICATORS IN GROUNDNUT (*Arachis hypogaea*)

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ABSTRACT

An experiment was conducted at the University of Jos, Plateau State, to evaluate the performance of groundnut (Arachis hypogaea L., variety EX-Dakar) based on the number of seeds per pod from which planting material was obtained. The study employed a Randomized Complete Block Design (RCBD) with five replications. Each replication consisted of five cement bags, each bag filled with 30 kg of soil and containing two plants, totalling 50 plants across the entire experiment. Four treatments were designated: T1 (seeds from 1-seeded pods), T2 (seeds from 2-seeded pods), T3 (seeds from 3-seeded pods), and T4 (a mixture of T1, T2, and T3). Growth and yield-related parameters including days to emergence, plant height, number of flowers, number of leaflets, stem girth, and number of leaves per plant were measured. Among the treatments, T2 showed superior performance across most parameters, suggesting that seeds from 2-seeded pods may possess enhanced vigour and field adaptability. Based on these results, T2 is recommended for optimal field planting under similar agroecological conditions.

Keywords: Groundnut, Seed per pod, Plant vigor, EX-Dakar, Pod selection, Crop performance, Randomized complete block design

GENETIC VARIABILITY STUDIES IN NINE SESAME (*Sesamum Indicum L.*) GENOTYPES COLLECTED FROM EBONYI STATE, NIGERIA.

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ABSTRACT

Sesame is an oil seed crop grown in Ebonyi state using both indigenous and improved varieties. However, the extent of variability among the genotypes is unknown, hence the need for this study. Nine sesame genotypes from Ebonyi State were arranged in RCBD with three replicates at the Federal College of Agriculture, Ishiagu. PCV was higher than GCV for all traits based on data collected on seven characters. Similarly, number of capsules (29.21%) and number of leaves (21.61%) gave the highest GCV. The number of leaves (50.03%), number of capsules (78.02%), and capsule length (50.00%) all had high heritability estimates. The number of leaves and number of capsules contributed significantly to genetic variability and can be improved through a simple selection procedure. Six out of the seven traits with high PCV suggests an environmental influence on the expression of the characters.

Keywords: Variability, heritability, sesame, genotype

SEEDLING GROWTH AND FRUIT YEILD OF ROSELLE VARIETIES (*Hibiscus Sabdariffa L.*) AS INFLUENCED BY GROWING MEDIA

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ABSTRACT

Hibiscus sabdariffa farming is an agricultural venture that involves the cultivation of hibiscus for commercial purposes in Africa. Hibiscus was described by Anjahet (2012) as an annual herb useful as edible ornamental and for soft landscaping of the environment. It belongs to the Maluaceare family, grown in the tropics and widely cultivated in Nigeria especially in the North-Eastern and middle-belt region. An experiment was conducted at the Horticultural nursery of Federal University of Technology Minna on latitude 90°36°50° and longitude 6°33°25°E and altitude of 200-300 m above the sea level in the Northern Guinea savannah zone of Nigeria between June and December, 2023 to determine the effect of growth media on Roselle varieties. The growth media include loamy soil, sandy soil, and sawdust. The two varieties are (NGBO2521 and NGBO2526). The treatment was a 2 by 3 factorial arrangement fitted into a completely randomize design (CRD) with 5 replications. Data collected on growth parameter was subjected to ANOVA using Genstat 12.0, LSD at 5% level probability. Highest number of leaves and fruits (10.6 and 5.6), tallest seedlings (16.1cm) was recorded for seeds grown in loamy soil. It could therefore be concluded that using loamy soils for the propagation of roselle is optimum.

Keywords: *Hibiscus sabdariffa,* Loamy soil, Sandy soil, and Sawdust,

IMPACT OF CLIMATE VARIABILITY ON RICE IRRIGATION WATER REQUIREMENTS IN DOWNSTREAM OF TUNGAN KAWO DAM, NIGER STATE, NIGERIA

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ABSTRACT

Climate variability brings about changes in water availability pattern which is important in agriculture. By indicating changes in trends will go a long way in providing the irrigational farmers with ample information enough to secure and reduce the uncertainties in these important rainfall parameters which dictates crop productivity particularly in the dry season. This study examined the impact of climate variability on rice production in parts of Niger State, Nigeria (2000 - 2022). The types of data used were both primary and secondary data. The information and results generated from the data collected directly from the field and previous researches were subjected to statistical treatment using inferential statistics (regression analysis) and presented in figures with analyzing comments. The findings revealed that Onset dates were not the first days of rainfall but the time the study area received an accumulated amount of rainfall sustain enough for cultivation of crops and the trend line equation was negative (y = -0.9354 + 59974) which depict decreasing trend in the days of occurrence of onset of rainfall in the study area. It was recommended that special project and strategies should be adopted to address the issue of water deficit during dry season and over flowing of the reservoir stations during raining seasons as this will help control surplus and deficit water inflow and outflow in all seasons as well as flooding, destruction of cultivated crops, arable lands and properties, while maintaining consistency in water flow.

Keywords: Climate Variability, Rice, Irrigation water and Downstream

HERITABILITY OF 4-, 5-, AND 6-LEAFLET TRAITS PER LEAF IN GROUNDNUT (*Arachis Hypogaea*)

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ABSTRACT

The experiment was conducted to evaluate the heritability and agronomic significance of leaflet number variation in groundnut (Arachis hypogaea). The study focused on three treatments based on leaflet expression: T1 – seeds from plants with four leaflets; T2 – seeds from plants with five leaflets; and T3 – seeds from plants with six leaflets. A Randomized Complete Block Design (RCBD) with six replications was used. Data collected included days to seed emergence, number of leaflets per leaf (at two-week intervals up to 10 weeks after sowing), days to flowering, number of pods per plant, number of seeds per pod, number of seeds per plant, and 100-seed weight. T3 recorded the lowest mean for days to germination and the shortest time to flowering, while T1 had the highest means for both. For leaflet number per leaf, T3 consistently showed higher values, with significant differences observed at six, eight, and ten weeks. T3 also had the highest mean values for number of pods per plant and seeds per plant, while T2 recorded the highest mean number of seeds per pod. Additionally, T3 had the highest 100-seed weight. The recurring expression of five- and six-leaflet traits across treatments suggests a heritable component. These findings highlight the potential of selecting for higher leaflet number in breeding programs aimed at improving growth and productivity in groundnut.

Keywords: Groundnut, leaflet number, heritability, morphological trait, genetic variation

INTEGRATED WEED MANAGEMENT AND SPACING STRATEGIES FOR OPTIMAL BAMBARA NUT (*Vigna Subterranea* (L.) Verdc) PRODUCTION IN THE GUINEA SAVANNA OF NIGERIA

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ABSTRACT

Bambara nut remains underutilized despite its nutritional and agronomic benefits in Sub-Saharan Africa. Weed interference, poor agronomic practices, and suboptimal plant spacing are major contributors to its low yield. A field experiment was conducted in 2021 at the Federal University of Technology, Minna, to evaluate the combined effects of intra-row spacing and integrated weed control methods on Bambara nut performance. Ten treatments combining spacing (20 cm, 25 cm, 30 cm), herbicide (Pendimethalin), and hoe weeding at 2, 4, or 6 weeks after sowing (WAS), along with a control, were laid out in a randomized complete block design with three replications. Results showed that 20 cm spacing combined with Pendimethalin application and hoe weeding at 2 WAS significantly reduced weed cover and biomass, while producing the highest plant height (37.60 cm), pod number (883), and grain yield (0.61 kg/plot). This approach offers a cost-effective, sustainable strategy for maximizing Bambara nut yield.

Keywords: Bambara nut, intra-row spacing, hoe weeding, yield.

COMPARATIVE ASSESSMENT OF SEED DRESSING MATERIALS ON THE VIABILITY AND VIGOUR OF STORED ROSELLE (*Hibiscus Sabdariffa* Linn.) SEEDS

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ABSTRACT

This study evaluated the effect of four seed dressing materials (T1–T4) on the germination performance of two roselle genotypes ("Zobo" and "Yakwa") during a six-week storage period. The experiment was conducted at the Crop Production Laboratory, Federal University of Technology, Minna, Niger State, Nigeria. Final Germination Percentage (FGP) and Germination Rate Index (GRI) were monitored weekly. Results showed that T1(Imidacloprid 20% + Metalaxyl-M 20% +Tebuconazole 2% WS) consistently maintained the highest FGP and GRI, ending at 19.75% and 16.67, respectively, at week 6. In contrast, T4 (control) showed the lowest performance, with FGP and GRI reduced to 6.50% and 6.93, respectively, at the same interval. Across all weeks, the Yakwa variety significantly outperformed Zobo, with FGP declining from 56.25% (week 0) to 21.00% (week 6), and GRI from 65.74 to 19.19, while Zobo declined from 17.88% to 5.25% (FGP) and 21.86 to 4.12 (GRI). Significant interactions between treatment and variety were observed at weeks 2, 5, and 6 ($p < 0.05$), indicating that seed dressing effectiveness was variety-specific. The T1(Imidacloprid 20% + Metalaxyl-M 20% +Tebuconazole 2% WS) and Yakwa combination proved most effective for preserving seed quality. These findings underscore the need for variety-targeted seed treatment strategies to maintain germination and vigour during storage.

Keywords: Roselle, seed dressing, final germination percentage, germination rate index, seed vigour, storage, variety interaction

EFFECT OF SODIUM HYPOCHLORITE ON THE MORPHOLOGICAL PARAMETERS OF OKRA (*Abelmoscus Esclulentus*).

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ABSTRACT

The cultivation of okra (*Abelmoschus esculentus*), an important vegetable crop, is often challenged by suboptimal growth conditions and reduced yields. This study was conducted to investigate the effect of sodium hypochlorite on the morphological parameters of okra, A completely randomized design was adopted for the experiment, and data were collected on parameters, including plant height, number of leaves, leaf length, and node formation. Optimal growth was observed at concentrations between 0.2% and 0.3%, which enhanced plant height, number of leaves, and yield-related traits. However, concentrations exceeding 0.3% (e.g., 0.4%) caused growth inhibition, likely due to oxidative stress and toxicity. The findings are consistent with prior research demonstrating the potential of sodium hypochlorite as a growth enhancer when applied at moderate levels. Future research is recommended to explore the effects of sodium hypochlorite under varying environmental conditions, soil types, and on different okra genotypes to ensure broader applicability and sustainability in agricultural systems. The results revealed that sodium hypochlorite significantly influences plant height, number of leaves, leaf length, and yield parameters, with optimal growth and yield observed at concentrations between 0.2% and 0.3%. However, higher concentrations (e.g., 0.4%) were found to inhibit growth, likely due to oxidative stress. The results provided valuable insights for agricultural practices and underline the potential of chemical treatments in crop improvement.

Keywords: Abelmoschus esculentus, Sodium hypochlorite, Morphological Parameters, Concentrations

CORRELATION AND PATH COEFFICIENT ANALYSIS IN MEDIUM MATURING SOYBEAN (*Glycine Max*) GENOTYPES

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ABSTRACT

A field experiment was carried out to identify high yielding soybean genotypes for the Makurdi environment and determine significant contributing characters for improving yield in some medium maturing soybean genotypes. The experimental design used was Randomized Complete Block Design (RCBD) with three (3) replications. Data were collected on the following parameters: Days to flowering, days to 50% flowering, days to 95% maturity, plant height, lowest pod height, number of pod per plant, branches per plant, seed weight, fodder weight and hundred seed weight. The result showed significant difference for all parameters measured (days to first flowering, days to 50 percent flowering, days to maturity, lowest pod height, number of pods per plant, number of branches per plant, fodder weight, seed weight and 100-seed weight). Only plant height showed no significant difference among the eleven genotypes of soybean evaluated. This imply that, increase in seed yield may be attributed to traits such fodder weight IITA-27 (4629.62) IITA-36 *(*3395.68*) and IITA*-8 *(*3073.50) *recorded the highest values also for seed yield. Indicating that these genotypes are promising and could be recommended for release. significant and positive correlation coefficients were detected between* pod *per plant and* fodder weight (0.34), between pods per plant and seed yield (0.41) and a negative significant correlation between pods per plant and 100-seed weight (-0.44). *Path analysis showed that the traits of* maximum direct effect was observed for FW (0.8576) followed by number of P/P (0.1238) and number of B/P (0.0595), D50%F (0.0586). However, negative direct effect was observed on days 95% Maturity (-0.1156), LPH (-0.0725), 100 seed weight (-0.0098) with seed yield. The results, denoted that the following traits fodder weight, 95% days to maturity and *days to flowering* should be given prime importance as they demonstrated a significant positive correlation coefficient and highly positive direct effect compared to other traits.

Keywords: Soybean, variety, Correlation, Path analysis, Yield and Yield Components

EVALUATION OF RICE (*Oryza sativa* Linnaeus) GENOTYPES FOR DROUGHT TOLERANCE USING TOLERANCE INDICES OF SEEDLINGS

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ABSTRACT

Drought is a major abiotic stress that adversely affects rice (*Oryza sativa* Linnaeus) production, particularly in rain-fed ecosystems. Rice is considered to be highly sensitive to water deficit due to its shallow root system and high-water demand, making it vulnerable to yield loss under drought conditions. In this study, ten genotypes of rice were evaluated for drought tolerance potential at the seedling growth stage at the Crop Production Laboratory of the Federal University of Technology, Minna. The genotypes were subjected to two contrasting water regimes: Polyethylene glycol 6000 (PEG-6000) mediated drought and normal conditions. The experiment was laid out in a completely randomized design with four replications. The result showed significant variations ($p<0.05$) across all seedling traits evaluated, including number of primary roots, root length, shoot length, fresh and dry weight of root and shoot, and root – to – shoot ratios. Under the stress condition, FARO 19 had the highest number of primary roots (24.67) while FARO 15 had the longest root length (7.00 cm), shoot length, and biomass parameters also varied significantly, with FARO 44 exhibiting superior fresh and dry biomass accumulation under drought conditions. Tolerance indices (TI) and Mean Tolerance Index (MTI) were calculated to identify genotypic performance stability across treatments. FARO 26 displayed the highest MTI (83.38), suggesting consistent tolerance across multiple traits. These finding highlights FARO 26, FARO 19, and FARO 44 as potential candidates for breeding programs targeting drought-prone environments.

Keywords: Rice genotypes, drought stress, seedling traits, tolerance index

GERMINATION AND LONGEVITY OF ROSELLE (*Hibiscus sabdariffa* CARL LINNAEUS) SEED GENOTYPES STORED AT DIFFERENT TEMPERATURE REGIMES

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ABSTRACT

The experiment was conducted to assess the germination performance and longevity of six Roselle seed genotypes sourced from Northern Nigeria: Jigawa, Sokoto, Zamfara, Katsina and two Niger under three seed storage temperatures: Incubator at 33℃, Room Temperature 29℃ and Refrigerator at 9℃. The treatments were arranged in completely randomized design. Data were collected on germination percentage, germination rate and speed of germination. Data collected were subjected to analysis of variance and means were separated using least significance difference. Results revealed that incubator condition recorded significantly poor germination, with accelerated seed deterioration. Room temperature storage showed moderate viability, with a significant drop in germination afterwards. Refrigerated seeds maintained the highest viability which enhanced seed viability and a sustained germination. Across genotypes, seeds from Jigawa and Sokoto performed best, while Zamfara, Niger narrow-leaf and Katsina showed significantly lower germination percentages. The Niger broad-leaf genotype seed recorded minimal germination throughout the duration. These findings revealed the understanding of genotype and storage temperature on Roselle seed viability responses and offer practical recommendations for optimizing seed conservation strategies in tropical environments.

Keywords: Germination, Longevity, Genotypes, Temperature

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