The analysis of adaptability and stability using AMMI and Wricke'secovalence stability coefficient methodologies identified genotypes, Gloria, Dark146, Iris and Natal sugar as the most stable. Genotypes ARA4, SEQ1040 and PAN148 were identified as the most unstable by Lin and Binns index, AMMI and Wricke's ecovalence methodologies. MG38 and VTTT925/9/1/2 are more stable and are recommended for release. There is need for breeders to consider the stability of varieties before release because high yielding genotypes are not always stable across locations.

Paper Number: 1398 (Poster Number: 270)

AMMI and GGE Biplot Analysis of Cowpea (Vigna Unguicualata) Advanced Lines for the Semi-Arid Region of Kenya.

Rose Wangari Kuruma, Kenya Agricultural Research and Livestock Organization*

AMMI And GGE Biplot Analysis Of Cowpea (Vigna Unguicualata) advanced lines for the Semi-Arid Region of Kenya Kuruma, R. Wangari 1* and Muriuki, C Kahwaga.2 1, 2 Kenya Agricultural Livestock and Research Organization – Katumani, P.O Box 90100-340, Machakos, Kenya. Email: kungurw@yahoo.com Abstract The genotype by environment interaction manipulates the selection criteria in multi-purpose crop like cowpea. This study was conducted to determine the adaptation of new advanced generation cowpea lines, quantify the magnitude of the genotype by environment interaction effects on cowpea grain yield and determine the winning genotypes for the test environments. Thirty cowpea breeding lines were evaluated at four locations located at different agro-ecological zones of Kenya. The genotypes were grown in randomized complete block design with three replicates during the 2014 and 2015 seasons Yield data was analysed using the additive main effect and multiplicative interaction model (AMMI) and GGE biplot. The AMMI analysis of variance for grain yield detected significant effects for genotype, location and genotype by location interaction effects. The most stable genotype in the high yielding group in this study was G5 (1005/1002/1/1/1), followed by G19 (1005/100/2) and G23 (1002/1005/3). The G5 could be used for broad selection since it was found to be the most ideal genotype with both high mean yield and high stability in comparison to other genotypes. The GGE biplot identified 2 mega-environments for growing cowpea. The results of this study indicated that the cowpea grain yield performance is greatly influenced by genotype by environment interaction effects. Keywords: - Genotype by environment interaction, AMMI, grain yield, stability, cowpea

Paper Number: 1399 (Poster Number: 271)

Genetic Studies of Winter Hardiness in Pea.

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ABSTRACT
Production of dry pea has been important and ranks third among legumes around the globe due to their high protein content and ability to symbiotically fix atmospheric nitrogen. Pea production is typically as a spring-sown crop, but in some countries (i.e. Australia) the crop is fall-sown. Many areas in Europe and North America at the higher latitudes are interested in planting more of the pea crop in the fall to avoid adverse conditions in the spring sowing period. Fall sowing allows the pea crop to avoid high summer temperatures experienced and often results in increased seed production. In order to take advantage of the benefits from fall sowing in the higher latitudes that traditionally experience extreme cold winter temperatures genotypes which are capable of surviving the winter conditions are necessary. This research aims to aid the development of winter hardy peas by developing improved screening methods to identify increased levels of cold hardiness. Phenotypic evaluation in controlled setting and development of a genetic map of the genes necessary for cold hardiness are key components of this research. The mapping of cold hardiness genes will aid in a more holistic understanding of the pea genome for further breeding. Development of improved protocols and molecular tools to detect cold hardiness in controlled environment will increase the productivity of breeding programs focused on cold hardiness.

Paper Number: 1400 (Poster Number: 272)

Responses of Cowpea Genotypes to Rock Phosphate Application.

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Cowpea (Vigna unguiculata(L.) Walp.) plays an important role in the livelihood of people in Sahel and Savanna regions of Sub-Saharan Africa. However, phosphorous (P) depletion is one of the constraints of its low productivity. Farmers cannot apply enough fertilizer because of inadequate supplies and lack of access to credit. Therefore, pot experiments were conducted to know the efficiency of the indigenous rock phosphate (RP) for cowpea cultivation under low P conditions. Shoot dry weight (SDW) at 8 weeks after seeding (WAS) had a significantly high correlation with P uptake ($r = 0.817$, $P < 0.01$). The rates of decrease of SDW from the control 30 mg P kg-1 (as KH2PO4) to 171 mg P kg-1 as RP (34% P2O5) were calculated.

Sixteen lines of the 28 tested genotypes obtained lower rate than the overall mean (22.6%). Seven of these lines showed a significant high SDW compared with IT97K-499-35 that had the lowest value. For four of the seven positive responder lines (Iron bean, IT87D-941-1, IT97K-499-38, and DanIla), their SDWs at 8 WAS in 57 mg P kg-1 or more were significantly higher than those with zero application. Their grain yield (GY) tended to be higher with 57 mg P kg-1or more, compared with zero application. Based on these results, at the least, RP application of 57 mg P kg-1 is necessary to enhance SDW and GY of good responder lines. This indicated the high possibility to establish reasonable production system to improve cowpea production.

Paper Number: 1401 (Poster Number: 273)

Relationships Between Yield and Its Components for Common Bean (Phaseolus vulgaris L.) in Burundi.

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Abstract
Knowledge of relationship among yield and the other agronomic characters is important in plant breeding, especially for the individual plant selection. The objective of this study was to assess the correlation coefficient and carry out path analysis between seed yield and its components. The experiments, in split split plot with three replications, were carried out in Burundi during 2013A and 2013B cropping seasons. Eight biofort common bean genotypes were assessed including a released variety taken as a control (GLP2). Direct and indirect effects of the yield components on seed yield were analyzed using path coefficient analysis. Seed yield was most affected by the number of days to 50% flowering and plant height in both 2013A and 2013B cropping seasons. Correlation analysis showed that seed yield was significantly affected by plant height (0.690***), pods per plant (0.660***), seeds per pods (0.380***) as positive and negatively affected by the number of days to Physiological maturity (-0.193**) and the weight of 100 seeds (-0.280***) during 2013A whereas it was effected significantly affected by plant height (0.278***) as positive and negatively affected by the number of days to physiological maturity (-0.281**) during 2013B. Combined correlation analysis over locations and seasons indicated that DFL was highly correlated with DPM (0.74*** and 0.606***) due to its indirect effect. Thus importance should be given for the above traits while selecting bean crop. According to the path analysis, plant height was the most important due to direct effect on the increase of seed yield on selection studies. Thus, this could be used as a selection criterion in dry bean breeding for high yield.

Résumé
La connaissance des relations entre le rendements et d'autres caractères agronomiques est important en amélioration des plantes, spécialement dans la sélection individuelle d'une plante. L'objectif de la présente étude était d'évaluer le coefficient de corrélation et de dégager le path analysis entre le rendement et ses composantes. Le dispositif expérimentale en split split plot avec trois répétition a été conduit au Burundi durant les saisons agricoles de 2013A et 2013B. Sept génotypes de haricot biofort ont été évalués en plus d'une variété améliorée de l'ISABU prise comme témoin. Les effets directs et indirects des composantes du rendement sur le rendement ont été analysés à l'aide du path coefficient analysis. Durant les deux saisons, la hauteur des plantes et le nombre de jours à 50% de floraison se sont montrés comme des composantes déterminant du rendements. Au cours de la première saison culturale, l'analyse de la correlation a montré que le rendement a été positivement affecté par la hauteur des plants (0.690***), nombre de gousses par plants (0.660***), nombre de grains par gousse (0.380***) et négativement par le nombre de jours à la maturité physiologique (-0.193**) et le poids de 100 graines (-0.280***). Par contre, au cours de la deuxième saison, le rendement était positivement affecté par la hauteur des plants (0.278***) et négativement affecté par le nombre de jours à la maturité physiologique (-0.281**). L'analyse combiné à travers les sites et saisons a montré que le nombre de jours à 50% de la floraison par son effet indirect était positivement corrélé avec le nombre de jours à la maturité physiologique (0.74*** and 0.606***). Ainsi, une grande importance peut être attribuée à ces dernières lors de la selection variétale. A travers les résultats du path analysis, la hauteur des plants s'est révélé être la plus importante par son effet direct dans l'augmentation du rendement. Par conséquent, il peut être utilisé comme critère de sélection dans l'amélioration du haricot avec but d'augmenter le rendement.

KEY WORDS: Phaseolus vulgaris L., Bean, seed yield, yield components, correlations; path analysis, Burundi.

Paper Number: 1402 (Poster Number: 274)

Evaluation of Cowpea Mutant Varieties in Comparison with Conventional Varieties.

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Title: Performance of cowpea mutants in comparison with conventional bred cowpeas varieties in Zambia
Breeding process in general requires significant amount of resources in both budgetary allocation and time. Mutation breeding for desired traits can offer cost effective tool to developing required cowpeas varieties. During the 2008 season in Zambia Agriculture Research Institute four improved cowpeas varieties with documented characteristics submitted to University of Zambia for blasting with irradiation. The aim of the irradiation was to achieve the traits of economic/agronomic importance in cowpea varieties for small-scale production. These are order of priority: pest tolerance, seed size/colour, and grain and leaf yields, earliness, and tolerance to existing soil tress. The first generation planted in replicated field trials showed some desired traits apart from yield compared to the four parents. These traits were seed colour, earliness, tolerance to soil stress and size of the leaves. The second season the trials was planted in replicated trials in two locations, Msekera research Station during the main rain season and advanced during the off-season under irrigation.