

Paper/Poster Abstracts

Therefore, Ethiopia is a center of diversity for cowpea and there is a great opportunities to improve cowpea for resistance to biotic and abiotic stresses and there is a need for selection of drought tolerant and short-season crop varieties that fit the growing season of such areas. Major cowpea production constraints in Ethiopia are scarcity of sufficient improved varieties for climate resilient such as drought, disease, weed and insect pest attacks at field, storage and in adequate cultural practices, low soil fertility and poor technology dissemination and popularization. However, only six cowpea varieties released from 1976 up to now with recommended production packages in Ethiopia in a one-size-fits-all fashion. Currently, Ethiopian government has given a good research attention for this crop due alleviating production and productivity of crop. It is therefore, important to revive research in this crop and to develop more varieties for biotic and abiotic stress resistance to wide range of Ethiopia. The current research focuses is to increase cowpea production, improve small holder household nutrition, improve the soils and possibly increase household incomes from the sales of the cowpea. Keywords/ Phrases: Abiotic stress, Biotic stress, Production constraints

Paper Number: 1344 (Poster Number: 216)

Increasing Efficiency in Cowpea-Cassava Crop Combinations in Kaoma, Zambia.

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Smallholder farmers in Zambia practice mixed crop farming. Cowpea (*Vigna unguiculata* (L.) Walp) is an important legume as it supports food and income security for poor farm families. Cowpea is a prominent crop in cassava cropping systems which contributes significantly to the soil quality and the soil nitrogen budget. Often cowpea-cassava systems are under-fertilized due to resource limitations leading to low productivity and soil degradation. To evaluate options of increasing productivity in cowpea-cassava crop combinations, experiments were conducted in Kaoma on sandy loam soils. Yield data from crop combinations (main plot) and fertilizer rates (sub-plot) were analysed to determine suitable management practices for cowpea-cassava crop combinations. The most limiting nutrient was determined from modelling data using QUEFTS.

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“Pulse Panchayats” - an Innovative Concept in Enhancing Productivity and Profitability of Pulses in Semiarid Regions of India.

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In India Pulses cultivation is mostly (85% area) under rainfed conditions by poor farmers with non-availability of high yielding and location specific variety, low seed replacement rate, susceptibility to pests, diseases, inefficient storage and market linkages. Pulse producing states have recently witnessed weather related issues resulting in importing 3-5 Mt (for 2015 - about 10Mt) of Pulses annually to meet the domestic demand. To achieve self-sufficiency in pulses, domestic demand for 2030 is projected to be 32 Mt. Hence the productivity needs to be doubled and an additional area of about 3.0 M ha brought under pulses besides reducing post-harvest losses. M.S.Swaminathan Research Foundation is promoting the concept of “Pulse Panchayats” through enhancing Natural Resources Management in two Semi Arid States of India. Vulnerability assessment has enabled understanding of coping mechanisms by farmers to climate variability. Climate resilient Pulse varieties of Black gram, Green gram, Red gram and Moth bean to Abiotic and Biotic stress factors were identified from 90 trials. Through Integrated Crop Management practices enhanced the productivity by 30% and adaptive capacity by 70%. Knowledge management through Farmers Field Schools using ICT tools were integrated through Village Knowledge Centres reaching over 1 million populations. Pulse Bio Park established for strengthening the local seed production systems, innovative storage bags, value addition managed by Farmer Producer Companies as a business model. The “Pulse Panchayat” movement is envisaged to have significant importance in Grain Legume research and development especially in countries with low income and high rates of undernourishment.

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Assessment of Population Density of Indigenous Cowpea Rhizobia in Nigerian Soil Using the Plant Infection Technique.

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The ability of legumes to nodulate with indigenous rhizobia in soil is of paramount importance in determining whether the legume can benefit from inoculation. The size of the population of indigenous rhizobia in soil affects greatly the ability of cowpea to nodulate and fix nitrogen fixation.

The indigenous rhizobia population and nodulation status of cowpea was assessed in a growth chamber using cowpea as a trap plant in soils collected from 30 different farm fields previously cultivated with cowpea from three different agro-ecological zones of Northern Nigeria. The most probable number of rhizobia in each soil among the sites, as estimated by the plant infection techniques varied from undetectable numbers to 1.7×10^4 cells g⁻¹ of soil. There were marked variations in the rhizobia population size among different agro-ecological zones, with the largest populations in soils from Kano and Niger. The rhizobia populations observed in the different sites are adequate to give satisfactory nodulation and nitrogen fixation in most cases. Further research will explore the possibility of increasing yields with elite rhizobium strains. Keywords: *Vigna unguiculata*, Rhizobia, Nodulation, most probable number, Northern Nigeria, Inoculant.

Paper Number: 1347 (Poster Number: 219)

Biological Nitrogen Fixation in Field Grown Groundnut As Quantified through ¹⁵N Natural Abundance Technique.

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Groundnut (*Arachis hypogaea* L.) is the most important grain legume in Ghana. However, poor soil fertility together with erratic rainfall distribution results in drastic yield reduction. Groundnut forms symbiotic relationship with rhizobia and fix atmospheric N₂ resulting in high crop productivity. Increasing food demand and the need to reduce carbon emissions makes this relationship a critical alternative to chemical N fertilizer use. Therefore the need to identify genotypes with superior symbiotic ability cannot be overemphasised. Previous studies on symbiotic efficiency of groundnut in Ghana have considered few genotypes. This study therefore evaluated the symbiotic efficiency, plant growth and pod yield of 21 groundnut genotypes in the Guinea savanna of Ghana in randomised complete blocks with four replicates. Symbiotic N contribution was assessed using the ¹⁵N natural abundance technique. There was significant variation in symbiotic efficiency, plant growth and pod yield among genotypes. Average N contribution by groundnut genotypes ranged from 48 to 108 kg N ha⁻¹ while mean pod yield ranged from 0.58 to 2.1 t ha⁻¹. Genotypes ICGV-IS 08837, ICG 6222 and NKATIESARI demonstrated superior symbiotic performance, plant growth and pod yield. ICGV-IS 08837 yielded 2.5 fold more than CHINESE which is the most widely cultivated variety in the region. In conclusion, genotypes ICGV-IS 08837, ICG 6222 and ICGV 03315 are recommended for further evaluations. To the best of our knowledge this is the first study to use ¹⁵N natural abundance technique to quantify N₂ fixation in Ghana.

Paper Number: 1348 (Poster Number: 220)

Assessment of Sustainable Production of Pigeon Peas in SMALL Scale Farmers in Morogoro Region - Tanzania.

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Abstract

High percentage of people from eastern and southern Africa live below the poverty line. Therefore ability of them to get access to basic needs became limited even in situations where they have access to land, they are unable to afford sufficient fertilizers and other farm inputs to produce sufficient crop. However growing legume crops i.e. Pigeon pea, beans, cowpeas and cereals i.e. maize and sorghum in one farm provide an opportunity to reduce expenses of using industrial fertilizers hence presents a great potential for improving livelihoods for resource poor African farmers. This brief highlights the potential contribution of legume crops to food security, income, the best management practices and policy implications for improving production. Beside good price of pigeon peas in 2015 in Tanzania many farmers still did not benefit from affordable price ever recorded, the constraints behind were believed to use of local varieties resulting in low yield, high cost of labour, inadequate processing and storage facilities, weed/pest infestation and lack of credit/ loans from banks and other financial institutions. It is believed that in order to enhance pigeon peas productivity then extension service should be made available to farmers, improved varieties should available under subsidy price to farmers, marketing policy to govern pigeon peas sales. And joint venture between all pigeon peas stake holders.

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Symbiotic Potential of Isolates from Indigenous Rhizobia Population in Ghana.

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SYMBIOTIC POTENTIAL OF ISOLATES FROM INDIGENOUS RHIZOBIA POPULATION IN GHANA O. Osei^{1*}, R. C. Abaidoo^{2,3}, N. Ewusi-Mensah¹, J. Ulzen¹ and A. Opoku¹. Department of Crop and Soil Sciences, Faculty of Agriculture, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana