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EFFECT OF LONG-TERM FERTILIZATION AND METEOROLOGICAL CONDITIONS ON THE TEST WEIGHT OF DURUM WHEAT GRAIN

Galia Panayotova¹, Svetla Kostadinova², Stefka Stefanova-Dobrev³

¹ Trakia University, Faculty of Agriculture, 6000 Stara Zagora, Bulgaria

² Agrarian University, Faculty of Agronomy, Mendeleev 12, 4000 Plovdiv, Bulgaria

³ Field Crops Institute, 6200 Chirpan, G. Dimitrov 2, Bulgaria

Abstract. The aim of this study was to investigate the influence of fertilization and meteorological conditions during the period 1990-2019 on the test weight of durum wheat grain in Central South Bulgaria. The influence of nitrogen and phosphorus rates - 0, 40, 80, 120 and 160 kg.ha⁻¹, as well as combined N-P fertilization in the same norms on durum wheat grain under conditions of long term fertilizing experiment in cotton-durum wheat crop-rotation was studied. It was found that meteorological conditions during the 30-year period have a strong significant impact on the test weight of the grain, and the effect of fertilization is unproven. There is a tendency for a decrease in the test weight with increasing nitrogen norm, while at phosphorus fertilization the values increase compared to the unfertilized.

Key words: *durum wheat, test weight, nitrogen, phosphorus, meteorological conditions.*

RESEARCH ON PRODUCTIVITY IN SEVEN NEW BULGARIAN COMMON WHEAT DEPENDING ON THE FERTILIZATION

Ivan Yanchev
Agriculture university- Plovdiv

Abstract. A comparative field experience has been arranged with the participation of seven varieties that have been placed under a different nutrition. Part of the Bulgarian selection is represented by the varieties: Alfio, Sigmund, Clausius, Colino, Lombardy, Navo and Speri. Moderate, balanced conventional fertilization was performed, as the first type of nutrition and three times the soil and foliar application of Amalgerol Essence biological stimulator as the second type. The degree of productivity and gradation of the studied varieties was determined. Applying Amalgerol Essence in combination with P₂O₅ stock fertilizer to a level of 22mg / 100g soil, productivity is offset by the result of moderate conventional fertilization. Amalgerol Essence has been shown to increase root mass by up to 22%. Microbial activity and the development of mycorrhiza have been established, whereby the insoluble forms of N, P, K, Cu, Zn and others are absorbed. A higher amount of leaf stem mass was found with higher% water in the main phases, such as brooding, stem formation and grain formation.

Key words: *Varieties, nutrition, Amalgerol essence.*

**LOAN REPAYMENT PERFORMANCE AMONG SMALLHOLDER
COOPERATIVE FARMERS IN DASS LOCAL GOVERNMENT AREA OF
BAUCHI STATE, NIGERIA**

***Umar, S, *Mohammed, H and **Jahun, M.S**

*Department of Agricultural Extension and Management,
Binyaminu Usman Polytechnic, Hadejia

**Institute of Development Communication
Ahmadu Bello University, Zaria

Abstract. The study analyzed the loan repayment performance among smallholder cooperative farmers in Dass Local Government Area of Bauchi State Nigeria. Cross sectional primary data were collected from 365 smallholder Cooperative farmers selected using multistage sampling procedure. Descriptive statistics and econometric techniques such as mean, percentages and binary regression were used data analysis. Empirical results revealed that, age of respondents and farm size were significant at 5 and 10% LS respectively, while annual income, household size, educational status, farming experience, amount borrowed, and interest rate charged were not significant. The mean age, household size, farming experience, farm size and annual income were found to be 46years, 13persons, 20years, 2ha and \$385.89. The loan repayment performance among smallholder cooperative farmers was 66.2%. The problems associated with loan repayment includes dual registration by farmers with another cooperative societies providing loan, involvement in partisan politics among members, farm output variation due to climatic and pest and disease, market price variation and untimely loan disbursement. To achieve a better repayment performance, policies and programmes capable of increasing sizes of loan and farm size, should be promoted. However, proper routine visits by the credit officers and educating the borrowers' others sources of income apart from their farms.

Key words: *Cooperative, Loan, Performance, Repayment, Smallholder*

**ECONOMETRIC ANALYSIS OF INCOME DIVERSIFICATION, SAVINGS
AND INVESTMENT AMONG SMALL-HOLDER VEGETABLE FARMERS IN
DRY LAND OF NORTHERN NIGERIA**

MAMMAN, B. Y.

**Department of Agricultural Economic and Extension Federal University Dutse,
Jigawa State Nigeria**

Abstract. The study was conducted to analyse the income diversification, savings and investment among small-scale vegetable farmers in dry land of northern Nigeria. A sample of 180 small-hold vegetable farmers were selected using multi-stage sampling technique. A structured questionnaire was adopted. Descriptive statistics, Regression analysis, and factor analysis were used for analysis. The results show that 97.2% of the farmers were males with a mean age of 48 years and mean household size is 12. The main livelihood is vegetable farming. Average propensity to save was found to be 18%. Logistic regression analysis revealed that educational status, income and membership of association of the farmers had significant ($p < 5\%$) influence on farmers' saving capacity. The results of poisson regressions analysis on the income diversification revealed that farm sizes, farming experience, off-farm income as well as household size were positive and statistically significant at 1%, 5% 1% and 10 % respectively. The adjusted R^2 value and F-ratio for income diversification model was 81.5% and 88.8% respectively Major constraints to saving and investment capacity include risk of capital lost, high expenditure on consumption and social obligation, poor access to credit, lack of banks, and high administrative cost of saving institutions. Therefore, it is wise to encourage farmers to diversify their economic activities to earn more income enabling savings so as to cover their expenditure on consumption and social obligation. There is need to mitigate farmers through insurance scheme so as to cover the risk of capital lost.

Keywords: *Income diversification, Savings, Investment, Expenditure, and Economy*

**PHENOLOGICAL DEVELOPMENT OF TRIBENURON-METHYL
RESISTANT SUNFLOWER HYBRIDS, GROWN IN THE CLIMATIC
CONDITIONS OF THE THRACIAN PLAIN**

Adelina Garapova

**PhD student, Agricultural University, Faculty of Agronomy, Crop Science
Department, 4000, Plovdiv, Bulgaria**

Abstract. In the experimental field of the Department of Crop Science at the Agricultural University - Plovdiv during the two harvest years - 2018 and 2019 a field experiment has been conducted. Five sunflower hybrids, all of the Tribenuron-methyl resistant hybrids group have been studied: P64LE25 (standard); LG 59.580 SX; Subaru HTS; ES Arcadia SU; Magma SU. The occurrence of the main phenological phases have been recorded: sowing, germination, second pair of leaves, the fourth pair of leaves, budding, flowering and ripening. Depending on the dates of the phenological phases, the duration of the interphase periods is calculated.

Key words: *sunflower; tribenuron- methyl resistant hybrids; phenological phases; interphase periods*

COMPARATIVE STUDY OF GRAIN MAIZE HYBRIDS IN THE AGRO- ECOLOGICAL CONDITIONS OF DOBRUJA REGION, BULGARIA

Hristofor KIRCHEV

Department of Crop Science, Faculty of Agronomy, Agricultural University

Abstract. The experiment has been carried out through the period 2017 - 2019 in the region of Dobruja, Bulgaria. The field trials have been conducted in block method in four replications with size of the experimental plot - 25 m². The tested corn hybrids belongs to 3 maturity groups, according to FAO classification – early, mid-early and mid-late. The experimental fields are located in various regions of the Dobruja region, in order to cover more soil and climate diversity. Grain yields were averaged over 4 replications, with the values equated to standard moisture of 14% and grain moisture at harvest. The average yields of maize grain obtained in Dobruja are lower than the national average. Divided into maturity groups, the PR38D89 hybrid is the most productive of the early ones, the PR37N01 hybrid the mid-early and the PR35F38 mid-late. Grain moisture shows a strong upward trend from early to mid-late hybrids, with a positive correlation between productivity and grain moisture.

Key words: *maize, grain yields, grain moisture, Dobruja*

STUDY THE ENVIRONMENTAL PERFORMANCE OF TWO TECHNOLOGIES OF FERTILIZATION AND IRRIGATION ON GRAIN MAIZE

Antoniya Stoyanova

Trakia University, Faculty of Agriculture, Stara Zagora 60000, Bulgaria

Abstract: The aim of this study is a comparative analysis of two technology solutions for fertilization and irrigation of maize grain. Studied the distribution of nitrogen in the soil profile and the level of contamination of the effluent. The analysis of both technologies for irrigation and nutrition with nitrogen grain maize in irrigation fertilization (traditional technology) and without fertilization furrows (new technology) seeks to establish the ecological relevance of each of them. Assays were performed in method for simultaneous determination of ammoniacal and nitrate nitrogen in the soil. Water samples of irrigation water were analyzed for nitrogen, the samples were taken at the beginning of irrigations of effluent irrigation for both variants are taking an average sample of irrigation furrows in the beginning in the middle and at the end of the flow in them. It was found that only the first watering and irrigation fertilized furrows has substantial exports of both mineral and nitrate nitrogen in the effluent. Most nitrate nitrogen is exported in irrigation furrows and fertilized at a higher fertilization rates.

Key words: *maize, technology solutions, nitrogen*

STUDY OF THE EFFECT OF ORGANIC FERTILIZER SIAPTON ON PRODUCTIVITY OF OIL ROSE (*ROSA DAMASCENA MILL*)

¹Roxana Mineva, ²Antoniya Stoyanova

¹Institute of Roses, Essential and Medical Cultures

²Trakia University, Faculty of Agriculture

Abstract: The aim of this study was to determine the influence of fertilizer "Siapton" on the productivity of oil rose (*Rosa damascena* Mill) and qualitative indicators of the received rose oil. The experiment was carried out in an experimental field at IREMK, Kazanlak in the period 2015-2017. The object of the study is the pink plantation of the "Svezhen" variety grown on leached forest soils. For the purpose of the study, experiments were conducted under irrigation and irrigation conditions. Applying fertilizer Siapton leads to an increase in the mass and diameter of the color of oil rose. After treatment with the organic fertilizer Siapton yield of the pink color of the oil rose (*Rosa damascena* Mill) increases. Treatment at a dose of 350 ml/da under irrigated conditions ensures an increase to 21.57%, while under irrigation - 21.20%. With natural moisture supply, the highest yields of rose oil were obtained by treatment with biotor at a dose of 250-350 ml/da. At irrigation, the yields were 28.7% higher after treatment with 350 ml/da.

Key words: *damask rose, organic fertilizer, rose oil, irrigation*

THE EFFECT OF THREE PRE-GERMINATION TREATMENTS ON THE GERMINATION AND EARLY GROWTH STUDIES OF *TECTONA GRANDIS* (TEAK) FOR RURAL AFFORESTATION

Amadi D.C.A; Jethro Glory; Kwada D.K and Thlama D.M.

Department of Forestry and Wildlife Management, Federal University Wukari, Nigeria.

Abstract. Decreasing natural timber resources have resulted in increasing interest in forest plantations as an efficient timber source and a means to reduce pressure on natural forests. At present, teak ranks among the top five tropical hardwood species in terms of plantation area established worldwide. Forest production and sustainability has been a great problem in Nigeria due to deforestation and degradation. Seed dormancy is one of the major problems of afforestation of Teak germination due to its stony impermeable endocarp. Therefore this study was undertaken to determine the effect of three different pre germination treatments on the germination and early growth studies on *Tectona grandis*. The study was conducted at the Department of Forestry and Wildlife Management Nursery, Federal University Wukari located in Taraba state of Nigeria. Seed lots collected from Federal College of Forestry Jos, Nigeria were subjected to three treatments: alternate soaking and drying for two weeks, soaking in water for two weeks, and scarification by fire. They were then planted in Poly pots of size 18 x 25cm filled with two potting mixtures and two plots for each treatment. Each plot had 12 poly post planted with 2 seeds. The treatments lay in a complete randomized block design (CRBD) and were placed under the shade and watered in the early morning hours every day. After the germination process at two leaves stage the seedlings were thinned for early growth studies. Data collected among others include germination count / percentage, leaf count, seedling diameter and height using veneer caliper, meter rule and physical counting. The data generated were subjected to two way analysis of variance ANOVA using SPSS software package. Statistical tools such as mean, percentages, bar charts and pie charts were also used. Results showed that alternating soaking and drying for 14 days enhanced fast germination of teak seed, height and number of leaves of the seedling and seedling diameter. Scarification by fire also had a significant effect on the germination of teak seed, seedling height, number of

leaves and seedling diameter while soaking in water for 14days did not have significant effect on the germination of teak. From this result it implies that alternating soaking and drying for two weeks is the best pre-germination treatment recommended to enhance germination of *Tactona grandis*.

Keywords: *germination, pre-germination, rural afforestation, tactona grandis, treatments*

TURKEY NEEDS A WATER FRAMEWORK LAW**Ali Telli**

Kutahua University, Turkey

Abstract. Preparing and adopting legal regulations, namely “Water Laws” concerning water rights, use and management has to be taken into political agenda with high priority. The law-making process should be fully participatory and completely transparent, aiming to conserve and develop water assets while recognizing access to water as a basic human right. Turkey should quickly prepare the water inventory on ecological basins of Turkey with inclusive methods and through a participatory process. This would give us a clear picture of “what is left” and offer the framework of the measures that can be taken into consideration to conserve and develop water assets in various ecological regions of Turkey. “Integrated basin management” should be realized with uttermost care for all the ecological basins. No hydropower plant (HPP) project or plan should be started, and the existing HPP plans and constructions should be taken on hold until completing the process of holistic basin planning which must be realized with strong and equal participation of civil society and especially local communities. The local communities should have a determining voice in the process, which means that no HPP can be started or built without a clear and proven approval from the local communities and other stakeholders.

Key words: *water, law, state legacy*

MINERAL COMPOSITION OF NOVEL SALT LICKS (TOKA) IN ADAMAWA STATE, NIGERIA

Adamu, Musa Sakuma¹ and Kubkomawa, Hayatu Ibrahim²

1. Department of Animal Health and Production Technology, Federal Polytechnic, P.M.B 35, Mubi, Adamawa State, Nigeria
2. Department of Fisheries Technology, Federal Polytechnic, P.M.B 35, Mubi, Adamawa State, Nigeria

Abstract. The objective of the study was to determine and establish mineral values of novel salt licks (toka) produced in Adamawa State, Nigeria. Five (five) novel salt blocks made from maize comb, beni seed straws, sorghum stover, cowpea husk and maize stover were bought from open markets in Mubi-North Local Government Area, Adamawa State, Nigeria. They were packaged neatly in polythene bags and labeled until used for analysis. The mineral contents of salt licks (toka) were analyzed using triple acid digestion methods. The results showed that, maize comb had the highest value of sodium (25.21%), followed by maize stover (22.19%) while sorghum stover (19.86%) had the least. Maize comb had the highest value of potassium (1.29%), followed by maize stover (1.17%) while sorghum stover (0.29%) had the least. Sorghum stover had the highest value of calcium (30.10%), followed by cowpea husk (29.86%) while maize stover (19.62%) had the least. Beni seed and maize stover had the highest value of iron (0.28%), followed by maize comb (0.26%) while cowpea husk (0.22%) had the least. Maize stover had the highest value of magnesium (2.84%), followed by maize comb (2.67%) while cowpea husk (0.23%) had the least. Maize comb had the highest value of phosphorus (6.64%), followed by sorghum stover (6.02%) while cowpea husk (0.53%) had the least. Beni-seed straws had the highest value of zinc (0.56%), followed by maize comb (0.53%) while cowpea husk (0.27%) had the least. Cowpea husk had the highest value of copper (0.23%), followed by beni-seed straws (0.21%) and maize stover (0.16%) recorded the lowest. Cowpea husk had the highest value of manganese (0.39%), followed by beni-seed straw (0.31%) with maize stover (0.20%) having the least. The results showed that, the novel salt licks had a negligible lead (Pb) content of 0.02%. Therefore, they can be used without any

problem to improve acceptability, palatability and mineral supplementation in livestock feeds. This could also conveniently substitute the usually imported, highly expensive mineral licks used for livestock production in the state and Nigeria as a whole.

Keywords: mineral composition, novel salt licks, livestock, adamawa state, Nigeria

SELECTIVITY AND STABILITY OF HERBICIDES AND HERBICIDE COMBINATIONS BASED ON GRAIN YIELD FROM SORGHUM (*SORGHUM BICOLOR* MOENCH.)

Grozi Delchev

Trakia University, Faculty of Agriculture, Stara Zagora, Bulgaria

Abstract: In the period 2012 – 2014 a field experiment was carried out with sorghum hybrid Arcansiel (*Sorghum bicolor* Moench.). It were tested 4 soil-applied herbicides: Tender EC (S-metholachlor), Silba SC (S-metholachlor + terbuthylazine), Sharpen 33 EC (pendimethalin) and Wing P (dimethenamid + pendimethalin) and 4 foliar-applied herbicides: Casper 55 WG (prosulfuron + dicamba), Cambio SL (bentazone + dicamba), Camix 560 SE (mesotrione + S-metholachlor) and Maton 600 EK (2,4-D ethylhexyl ester). In all variants seeds were treated with the herbicide antidote Concep III (fluxofenin) to protect sorghum from the phytotoxic effect of anti-cereal herbicides. Herbicide combinations Silba + Casper and Wing + Cambio result in obtaining high grain yields of sorghum. High grain yields are also obtained in the herbicide combinations Silba + Cambio, Sharpen + Cambio, Tender + Casper and Wing + Casper. Combining of Camix and Maton with soil herbicides results in lower grain yields. The most unstable are the herbicide Maton and its combinations with the herbicides Tender, Silba, Sharpen and Wing. Technologically the most valuable are the herbicide combinations Wing + Cambio and Silba + Casper. They combine high grain yield with high stability in the years. The single use of the herbicides Camix and Maton gets lower ratings due to their weaker efficacy against weeds and sunflower self-sown plants.

Keywords: *grain sorghum, herbicides, grain yield, selectivity, stability*

**SELECTIVITY AND STABILITY OF HERBICIDES AND HERBICIDE
COMBINATIONS BASED ON GRAIN YIELD FROM WINTER OILSEED
CANOLA (*BRASSICA NAPUS* L.)**

Grozi Delchev

Trakia University, Faculty of Agriculture, Stara Zagora, Bulgaria

Abstract: In the period 2012 – 2014 a field experiment was carried out with the conventional Maximus hybrid PX113 (*Brassica napus* L). A total of 16 variants were tested. The efficacy of the herbicide Salsa 75 WG (ethametsulfuron-methyl) in single use is higher when applied with the adjuvant Trend 90 compared to the adjuvants Codacide and Silwet L-77. In tank mixtures of Salsa 75 WG and Butisan max (metazachlor + quinmerac + dimethenamid) and Butisan duo (metazachlor + dimethenamid), the herbicide efficacy and aftereffect against graminaceous weeds are higher when applied with the adjuvant Codacide. In concomitant use of Salsa 75 WG and Select super 120 EC (clethodim) with the adjuvant Codacide synergetic effect is reported. In the tank mixture of Salsa 75 WG + Targa super 5 EC (quizalofop-P-ethyl), higher efficacy is reported in its combined use with the adjuvant Trend 90. Technologically the most valuable are the tank mixtures of the herbicides Salsa 75 WG, Butisan max and Butisan duo with the participation of the adjuvant Codacide, followed by those with the participation of the adjuvant Trend 90. From the point of view of the technology for growing winter oilseed canola, tank mixtures of Salsa 75 WG with the herbicides Select super 120 EC and Targa super 5 EC are also highly rated, followed by that of Salsa 75 WG with Galera super (clopyralid + picloram + aminopyralid). The combinations of Salsa 75 WG with the adjuvants Trend 90, Codacide and Silwet L-77, but without the participation of a partner herbicide and the herbicide combination Modawn 4 F (bifenox) + Aramo 50 (tepraloxymid) are rated low.

Keywords: winter oilseed canola, herbicides, seed yield, selectivity, stability