

DESIGN, CONSTRUCTION AND EVALUATION OF POTATO DIGGER WITH ROTARY BLADE

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ABSTRACT. Potato has an important role in human food. It was the sixth alimentary product in the world after sugar cane, maize, rice, wheat and milk in 2011 year. In addition, potato is the third product in Iran after wheat and sugar cane in 2011 year. Therefore, any attempt in the improvement of potato harvester will be valuable. In this study, a new semi-mounted one-row potato digger with rotary blade was designed and made in the workshop of Shahrekord University. It can be connected to rotary potato graders. Transmission system was mechanical from tractor (PTO) to blade by belt, pulley, gearbox, chain and sprocket. Blade diameter was 76 cm and the length was 10 cm which was assigned by the researchers. For separating of soil from potato, a helix containing bars with 2.6 cm distance and diameter of 9 mm was applied. Entered soil into set was calculated as 227 ton/h. Required power was got 5.5 horsepower. Computerized model of set was prepared in Mechanical Desktop Software and potato motion was studied in Visual Nastran Software. The device was tested at field with various advance speed, blade angle and rotational speed. Results showed that advance speed of 1.5-3 km/h, rotational speed of 20-25 RPM and blade angle of 10-15° were proper for system. The average of damaged potatoes was 4%.

Key words: Rotary Potato Digger; Feed Rate; Helix; Potato Damages; Simulation.

MECHANICAL DAMAGE TO CHICKPEA SEEDS AS AFFECTED BY NPK FERTILIZATION

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ABSTRACT. The aim of research was to determine the effect of nitrogen (N), phosphorus (P) and potassium (K) fertilizers on the some physical properties and mechanical damage to chickpea seeds under impact. The material for tests was from a field experiment with varied levels fertilization with nitrogen (0 and 50 kg/ha, N), phosphorus (0 and 100 kg/ha, P₂O₅) and potassium (0 and 100 kg/ha, K₂O). The variation of the mechanical damage was analyzed depending on the mode of varied fertilization, seed moisture content and impact energy. It was found that the chickpea seeds were bigger with NPK supply. The effects of phosphorus and potassium fertilizers rates on the mechanical damage to chickpea seeds was significant at 1% probability level ($P < 0.01$) and increased its hardness and resilience therefore caused the better resistance to impact damage. Potassium fertilization rate had the most influence and phosphorus fertilization rate had the least. The effect of the nitrogen fertilizer rate was not significant ($P > 0.05$). Harvesting chickpea seeds at higher moisture content and lower impact energy should give lower breakage when NPK is supplied, as well as when no NPK is supplied.

Key words: Chickpea; Mechanical damage; Harvesting; Handling; Fertilization.

INFLUENCE OF CHEMICAL FERTILIZERS APPLICATION ON AUTUMN WHEAT YIELD IN LONG-TERM EXPERIENCES AT AGRICULTURAL RESEARCH AND DEVELOPMENT SECUIENI, NEAMŢ COUNTY, ROMANIA

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ABSTRACT. The current paper intends to interpret from a technical point of view the data and yield functions which resulted from applying different fertilizer doses with nitrogen and phosphorus. The analyzed parameters (yield, yield increase, marginal increase) represent basic elements with determining role in establishing the doses and approximating the economic efficiency when applying fertilizers. The data comes from a long time experience with chemical fertilizers at Agricultural Research and Development Station (A.R.D.S.) Secuieni, Neamţ county, Romania, since 1975 and examines the results obtained between 2010-2012. As a result of nitrogen and phosphorus chemical fertilizers application (compared to the unfertilized version N_0P_0), were achieved yield increases of 5-56%, representing 234-2342 kg/ha. The resulted yield have been influenced by the fertilizer's type but also by the weather conditions in the research period. The use of phosphorus fertilizers in doses of P_{40} - P_{160} brought medium yield increases compared to the unfertilized version P_0 of 5-13% representing 256-681 kg/ha, and those with N_{40} - N_{160} nitrogen brought medium increases (compared to the unfertilized version N_0) of 15 -35% representing 599-1584 kg/ha. The production increases were directly correlated with the doses used, establishing highly significant correlations. The yield increases achieved by applying 1 kg of fertilizer active matter had medium values of 4.25-8.82 kg wheat/kg active matter P_2O_5 at phosphorus fertilizers and 9.9-14.97 kg wheat/kg active matter N at nitrogen fertilizers. These increases were indirectly correlated with the applied doses.

Key words: Wheat; Phosphorus; Nitrogen; Yields;

REZUMAT. Influența îngrășămintelor chimice asupra producției la cultura grâului de toamnă în experiențele de lungă durată la S.C.D.A. Secuieni, județul Neamț. Lucrarea își propune să interpreteze, din punct de vedere tehnic, datele și funcțiile de producție, rezultate ca urmare a aplicării diferitelor doze de îngrășămintă cu azot și fosfor. Parametrii analizați (producția, sporul de producție, sporul marginal) constituie elemente de bază, cu rol determinant în stabilirea dozelor și în aprecierea eficienței economice la aplicarea îngrășămintelor. Datele provin dintr-o experiență de lungă durată cu îngrășămintă chimică, organizată la S.C.D.A. Secuieni-Neamț din anul 1975, și analizează rezultatele obținute în perioada 2010-2012. Prin aplicarea îngrășămintelor chimice cu azot și fosfor (față de varianta nefertilizată N_0P_0) s-au obținut sporuri de producție de 5-56%, reprezentând 234-2342 kg/ha. Producțiile obținute au fost influențate de tipul îngrășământului și de condițiile climatice din perioada de cercetare. Utilizarea îngrășămintelor cu fosfor în doze de P_{40} - P_{160} a adus sporuri de producție medii, față de varianta nefertilizată P_0 , de 5-13%, reprezentând 265-681 kg/ha, iar cele cu azot de N_{40} - N_{160} , sporuri medii (față de varianta nefertilizată N_0) de 15-35%, reprezentând 599-1584 kg/ha. Sporurile de producție au fost corelate direct cu dozele folosite, stabilindu-se corelații foarte semnificative. Sporurile de producție realizate prin aplicarea a 1 kg de îngrășământ s.a. au avut valori medii de 4,25-8,82 kg grâu/kg s.a. P_2O_5 la îngrășămintele cu fosfor și de 9,9-14,97 kg grâu/kg s.a. N la îngrășămintele cu azot. Aceste sporuri au fost corelate indirect cu dozele aplicate.

Cuvinte cheie: grâu; fosfor; azot; producții.

THE EFFECT HALO-AND HYDRO-PRIMING ON SEED RESERVE UTILIZATION AND SEED GERMINATION OF WHEAT SEEDS UNDER SALINITY STRESS

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ABSTRACT. Seed germination and seedling growth are critical stages in the life cycle of a plant, especially under adverse abiotic stresses. Seed germination negatively affected by stress conditions. Seed priming techniques have been used to increase germination characteristics and improve germination uniformity in more field crops under stressed conditions. This experimental aimed to evaluate the effect of salinity and halo-priming on seed reserve utilization and seed germination of wheat seeds. For create salinity stress, NaCl in osmotic levels at 0 (as control), -4, -8, - 12 and -16 bar was used. Seeds of were pretreated with halo-priming at 10°C for 24 h and water at 10°C for 24 h. Our results showed that treatment×drought interaction on these traits: germination percentage, weight of utilized (mobilized) seed, seed reserve utilization efficiency, seedling dry weight and seed reserve depletion percentage were significant. The highest germination percentage was obtained from halo priming in control conditions. Thus priming improved study traits in wheat under salinity stress. Priming increased germination percentage and seed reserve utilization as compared to the unprimed seeds. The highest germination percentage and seed reserve utilization were as obtained from halo priming in control conditions.

Key words: Halo priming; Hydro priming; Salinity stress; Seed reserve utilization; Wheat.

ESTIMATION OF QUALITY DETERIORATION IN DIFFERENT RICE GENOTYPES INFESTED BY *TRIBOLIUM CASTANEUM* (HERBST) UNDER A BIOTIC STRESS

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ABSTRACT. Rice being a major crop of Pakistan contributes major part of our economy and provides energy to a major population. So study was carried out to determine potential of nutritive losses in six rice genotypes against red flour beetle, *Tribolium castaneum* (Herbst) at 28°C, 32°C and 35°C. For nutritive losses, crude protein, fiber, ash and moisture content was analyzed through proximate analysis after 90 days of beetle infestation. Results deduced from the present findings shown significantly ($P < 0.05$) substantial variations in nutritional composition of rice grains in some advanced rice genotypes when exposed to artificial infestation of red flour beetle. High moisture content was observed in KSK-133 and Basmati-2006 as compared to KSK-282. Loss in crude fat and protein were maximum in KSK-282 and minimum in KSK-133 and Basmati-2006. Crude fiber was significantly ($P < 0.05$) high where insect infestation was low and least value where maximum infestation caused by insect. Ash content was severely affected by destructive activity of insects in all genotypes. In aggregate qualitative losses were significantly ($P < 0.05$) high in KSK-133, Basmati-2006 and Basmati-515 and low in Basmati-385 and KSK-133 proving susceptible and resistance respectability, respectively. Findings should be incorporate in breeding programme and can also be helpful in post-harvest storage.

Key words: Qualitative losses; Red flour beetle; *Tribolium castaneum* (Herbst); Resistance; Rice genotype.

STIMULATED EFFECT OF ORGANIC AND INORGANICALLY ORIGINATED TRANSITORY NITROGEN SOURCES ON THE NUTRIENT CONCENTRATION, UPTAKE AND PRODUCTION OF HYBRID MAIZE

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ABSTRACT. Soil productivity one of the essential factors which enhanced either through adding the chemical fertilizer or by incorporation of organic sources of nutrients to the soil. Regardless by the used of imbalanced fertilizer without the application of organic manure and without seeking knowledge of crops and fertility classification of soil causes to much hazards such as deterioration of soil structure, soil and water pollution etc. Two years field experiment was carried out to check the impact of transitory nitrogen sources on the nutrient concentration, uptake and production of hybrid maize at the Agronomic Research Area, University of Agriculture Faisalabad, Pakistan, during the year 2008-2009. Treatments included two hybrids: H₁ (Pioneer-30Y87) and H₂ (Pioneer-31R88) with six nitrogen sources each, which included at the rate of S₀: control (0) kg N ha⁻¹, S₁: chemical source (urea) 250 kg N ha⁻¹, S₂: poultry manure (PM) 9.6 t ha⁻¹, S₃: farm yard manure (FYM) 17.8 t ha⁻¹, S₄: pressmud of sugarcane (PMS) 8.5 t ha⁻¹ and S₅: compost (C) 10.0 t ha⁻¹. Finding concluded that changing effect of nitrogen sources on both maize hybrid was found to be non significant during 2008-2009 while grain yield was significant during both years. Maximum nutrient concentration, uptake and yield were observed with nitrogen source S₁: chemical source (urea) 250 kg N ha⁻¹ during 2008-2009 as compared to other nitrogen sources and minimum was found in control (0) kg N ha⁻¹, respectively. Interaction among hybrid and nitrogen sources was found to be non significant.

Key words: Chemical; Natural; Nitrogen sources; Hybrids; Economic yield.

ASSESSMENT OF GENETIC DIVERSITY OF SOME WILD POPULATIONS OF *THYMUS KOTSCHYANUS* USING RAPD MOLECULAR MARKERS

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ABSTRACT. RAPD molecular markers were used to assess the genetic diversity of some population of thyme (*Thymus kotschyanus*) from Iran. The 17 ten-nucleotide primers used that produced 185 high-resolution bands, which 21 of these were monomorphic and 162 were polymorphic. An average, 10.88 bands were obtained per primer and 9.52 of these were polymorphic. POPGENE software was used to calculate Nei's genetic distance among populations and based on the cluster analysis of this matrix, a UPGMA dendrogram was drawn using the software NTSYS-pc. On the basis of dendrogram among populations of wild mountain thyme, Avan (Qazvin) and Siahkal (Gilan province) populations was the most similar between studied populations with the distance of 0.094 high dissimilarity was observed between Qazvin and Mazandaran 2 populations with the distance of 0.185 within populations variation based on Shannon's information index and Nei genetic diversity index showed that Takestan (I= 0.26; H= 0.3) and Alamut (I= 0.24; H= 0.15) had a highest and lowest within populations variation compared to other populations, respectively. Average of F_{st} and N_m indices, which represent the amount of gene flow between populations, were recorded as 0.26

and 1.361, respectively, which reflects the high level of gene exchange between ten populations of *Thymus kotschyanus*.

Key words: Genetic diversity; *Thymus kotschyanus*; RAPD; Population; Medicinal plant.

GERMINATION AND GROWTH IN CONTROL AND PRIMED SEEDS OF PEPPER AS AFFECTED BY SALT STRESS

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ABSTRACT. Salinity is an important abiotic stress which can affect crop production in the world. One of the simplest methods for improving salinity tolerance of plants is seeds priming. This experiment was conducted to evaluate the effects of seeds priming with three solutions (KCl, NaCl and CaCl₂) in germination and later growth of three pepper (*Capsicum annum* L.) cultivars: Beldi, Baklouti and Anaheim Chili. Seeds germination was conducted in a completely randomized design under seven salinity levels (0, 2, 4, 6, 8, 10 and 12 g L⁻¹) at room temperature for primed and control seeds. Plants derived from these germinated seeds (control and primed) were transplanted and cultivated in a greenhouse for 4 months and were irrigated permanently with seven salinity levels (0, 2, 4, 6, 8, 10 and 12 g L⁻¹). The results showed that salinity affected all parameters under study like total germination percentage and chlorophyll level (a and b). As well, proline content increased as response to increasing salinity. The plants derived and grown from primed seeds showed a considerable tolerance to salt stress and gave better results. In fact, priming improved the salt resistance of pepper owing to more chlorophyll and proline accumulation. These results suggest that seed priming induced possible physiological adjustments in pepper seeds, especially in the early stages of development, and could be used as a suitable tool for improving germination and growth characteristics under salt stress conditions.

Key words: Seed priming; Pepper; Proline; Chlorophyll level.

COMPARISON OF DIFFERENT TREATMENT METHODS OF SALICYLIC ACID ON SOME PHYSIOLOGICAL TRAITS OF WHITE BEAN UNDER SALINITY STRESS

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ABSTRACT. It has been shown that salicylic acid (SA) acts as an endogenous signal molecule responsible for inducing biotic and abiotic stress tolerance in plants. The effect of three application methods (Soil, Foliar and Priming) and four salicylic acid concentrations (0, 0.1, 0.5 and 1.0 mM) on chlorophyll a, b and total chlorophyll, carotenoids, proline, protein and soluble sugars of NaCl (4 ds/m) stressed white bean (*Phaseolus vulgaris* L.) was investigated. The results showed that the effect of applied concentrations and application methods on chlorophyll a and total chlorophyll, proline, protein and soluble sugars were significant. The interaction of concentrations and application methods used was significant on protein, proline and soluble sugars. According to the results, the greatest impact was belonged to the soil treatment which was not significantly different from priming. Among applied concentrations, the concentration of 0.1 and 0.5 mM were the most effective and the concentration of 1 mM was not significantly different from the control.

Key words: Application method; Salinity; Salicylic acid; White bean.

PRELIMINARY RESEARCHES REGARDING THE CONSERVATION OF ENDANGERED LOCAL CATTLE TO BE ABANDONED AND THE ACHIEVING OF MEAT HYBRIDS THROUGHOUT THE HYBRIDIZATION WITH ROMANIAN BREEDS

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ABSTRACT. Studies were performed on first generation meat hybrids, from the Bălțată cu Negru Românească (BNR) dairy cattle, into four experimental groups of five animals /group, in relation to meat bulls breeds from which the frozen semen material used for cows artificial insemination, respectively: Group E1- Limousine (Li), E2 - Aberdeen Angus (AA), E3 - Blue Blanch Belgian (BBB) and E4 - Charolaise (CH). The hybrids obtained from the experimental groups were observed in terms of dynamic growth and development through biometric measurements and periodic weightings 3 months intervals until 12 months of age. Average Daily Gain (ADG) recorded different variations in report to age and breed: at six months old, between 418.52 ± 60.97 g (Group E3 -BBB) and 486.67 ± 108.66 g (Group E2 - AA), at 12 months old, between 997.22 g (Group E2 – AA) and 1311.11 g (Group E3 -BBB). Slaughter rate at 12 months showed variations in relation to breed and thermal regime, so in hot regime the values ranged between 56.62 % (BNR x AA) and 60.60 % (BNR x BBB) and in cold regime (to 24 hours) between 55.68 % (BNR x AA) and 59.73 % (BNR x BBB). Carcasses development indicators had values in most cases in favor of BNR x AA hybrids than BNR x BBB hybrids, with significant differences ($P \leq 0.01$) regarding the width index (201.43 cm to 175.84 cm) and pulp development index (129.27 cm to 110.64 cm). From results analysis it can be concluded that in endangered local cattle, to be abandoned because of productive reform or not relevant point of view of milk production can be used in first generation for hybridization with meat breeds in obtaining meat hybrids with morphological features, slaughter rate and carcass structure from superior quality categories than the maternal breed.

Key words: Dairy cows; Frozen semen material; Meat hybrids; Morphological parameters; Slaughter rate.

REZUMAT. Cercetări preliminare privind conservarea raselor de taurine locale aflate în pericol de abandon și obținerea unor hibrizi pentru producția de carne prin hibridarea cu rase românești. Studiile au fost efectuate pe hibrizi de carne de primă generație, obținuți de la vaci de rasă Bălțată cu Negru Românească (BNR), repartizați în patru loturi experimentale a câte cinci capete/lot, în funcție de rasele taurilor de carne, de la care s-a utilizat material seminal congelat (m.s.c.) pentru însămânțarea artificială a vacilor selectate, respectiv: Lotul E1 - Limousine (Li), Lotul E2 - Aberdeen Angus (AA), Lotul E3 - Blue Blanch Belgique (BBB) și Lotul E4 - Charolaise (CH). Producții obținute de la vacile BNR din loturile menționate au fost urmărite în ceea ce privește creșterea și dezvoltarea în dinamică prin determinări biometrice și cântăriri periodice la intervale de 3 luni, până la vârsta de 12 luni. Sporul mediu zilnic (SMZ) a înregistrat variații la 6 luni, între $418,52 \pm 60,97$ g (Lot E3-BBB) și $486,67 \pm 108,66$ g (Lot E2-AA), iar la 12 luni, între $997,22$ g (Lot E2-AA) și $1311,11$ g (Lot E3-BBB). Randamentul la sacrificare, la vârsta de 12 luni, a prezentat variații în funcție de rasă și de regimul termic: la cald, valorile au oscilat între 56,62 % (BNRxAA) și 60,60 % (BNRxBBB), iar la rece (la 24 ore), între 55,68 % (BNRxAA) și 59,73 % (BNRxBBB). Indicii de dezvoltare ai carcaselor au prezentat valori, în majoritatea cazurilor, în favoarea hibridului BNRxAA, cu diferențe distinct semnificative ($p \leq 0,01$) în ceea ce privește indicele lărgimii carcapsei (201,43 cm față de 175,84 cm, cu o diferență de +25,59 cm) și indicele de dezvoltare a pulpei (129,27 cm față de 110,64 cm). Din analiza rezultatelor se poate concluziona că vacile locale, aflate în pericol de abandon din cauza reformei productive sau pentru că nu prezintă interes din punct de vedere al

producției de lapte, pot fi utilizate în încrucișări de prima generație cu tauri din rase specializate pentru producția de carne, în vederea obținerii unor hibrizi de carne cu însușiri morfoproductive, cu un randament la sacrificare și o structură a carcasei calitativ superioare rasei materne.

Cuvinte cheie: vaci de lapte; material seminal congelat; tauri de carne; hibrizi de carne; prima generație; parametri morfologici; randament sacrificare.