STRATEGIES FOR SOIL AMELIORATION USING SULPHUR IN SALT AFFECTED SOILS

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ABSTRACT. Effective use of salt affected soils needs the development of the most efficient and suitable reclamation technology to optimize farm management and better crop yields. Different chemical methods and amendments are used to reclaim the salt affected soils and after reclamation such soils may be used for sustainable agricultural production. Choice of a chemical amendment depends on its availability, cost, handling and time of application. Application of sulfur is very effective technique to suppress the uptake of undesired toxic elements and to improve the quantity and quality of produce in salt affected soils. So, a three-year field experiment was carried out to evaluate the comparative reclamation efficiency of two sulfur sources, i.e elemental sulfur and gypsum to improve the soil conditions by reducing the salinity/sodicity impact and yield characteristics of rice and wheat crop. A saline-sodic field {($EC_e = 6.10$ dS m^{-1}, $pH_s = 9.21$ and SAR = 41.67 (mmol L^{-1})$^{1/2}$, SO_4-S = 16.0 (mg kg^{-1}) and soil gypsum requirement (SGR) of 9.10 t ha^{-1} for 0-15 cm soil depth} was selected. The treatments included were: control, gypsum application @ 100 SGR, S application @ 25, 50, 57, 100 and 125 % of SGR. Statistical analysis of three-year pooled data showed that varying levels of sulfur and gypsum significantly improved soil properties and rice-wheat yield than control, however, gypsum @ 100% of soil GR was at par with S @ 125 and 100% of SGR in term terms of improving yield component of both test crops and reducing soil pH_s, EC_e and SAR. Efficiency of treatment could be arranged as gypsum @ 100% SGR = S @ 125% of SGR= S @ 100% of SGR> S @ 75% of SGR> S @ 50% of SGR> S @ 25% of SGR>control.

Keywords: gypsum; sulfur; reclamation; rice; wheat; crop rotation; salinity.

IS BETTER MINIMUM THAN STANDARD MOULDBOARD PLOUGHING TILLAGE FROM VIEWPOINT OF THE PORE-SIZE DISTRIBUTION AND SOIL WATER RETENTION CHARACTERISTIC CHANGES ?

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ABSTRACT. At present time exists a lot of soil tillage practices with different effects on soil productivity, therefore the effects of two tillage systems (conventional: CT, and miminum: MT) and two different soil types (Chernozem and Mollic Fluvisol) on soil physical quality indicators and water availability were evaluated in an on-farm study in the Krakovany (Danube Lowland, Slovakia). We evaluated pore-size distributions and selected hydro-physical properties (capillary rise, maximum capillary water capacity and retention water capacity). The total porosity (P) on average by 23% and by 14%, non-capillary pores (Pn) by 271% and by 114% and semi-capillary pores by 102% and by 192% were significantly greater for CT than MT in Chernozem and in Mollic Fluvisol, respectively. The content of capillary pores (Pc) was significantly greater for MT than CT on average by 13% and 8% in Chernozem and in Mollic Fluvisol, respectively. The average content of capillary rise (Θ_{CR}), maximum capillary water capacity (Θ_{MCWC}) and retention water capacity (Θ_{RWC}) were higher by 6, 10 and 13% under MT than CT in soil profile of Chernozem. The same effect of soil tillage systems in Mollic Fluvisol

was not observed. In Chernozem under MT with increased P, Θ_{CR} significantly increased, however, under CT, the Θ_{CR} significantly decreased. At the same time we determined negative correlations between Pn and soil water retention characteristics under CT. Higher content of Pc resulted in higher values of capillary rise, maximum capillary water capacity and retention water capacity in both soil types under both tillage systems.

Keywords: tillage systems; porosity; hydro-physical properties; Chernozem; Mollic Fluvisol.

A STUDY OF SOURCE AND SINK RELATIONSHIPS TO SELECT WHEAT LINES AND GENOTYPES FOR DROUGHT TOLERANCE

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ABSTRACT. In current study, 14 genotypes of bread wheat chosen by breeding tests in Zanjan Agricultural Research Institute of Iran were exposed to two experiment under irrigation and late season drought stress. The experiments were conducted between 2012-2013 in a randomized complete block design with three replications. Analysis of variance showed that, under non-stress condition, the differences among genotypes were significant regarding biological yield and grain weight per spike, while under stress condition in addition there were significant differences about grain yield and biological yield at pollination stage. Under normal and stress condition, the highest and the lowest biological yield was observed in genotype 3 (52.6 g per 15 stems), genotype 2 (35 g per 15 stems), respectively. The average weight of grain per spike decreased by 44.38 % under drought stress condition. In flag leaf removal experiment, results showed that the genotypes significantly differed under non-stress condition regarding the spike weight, grain weight per spike and weight of the leaves, except flag leaf, while under stress condition there were significant differences among genotypes in terms of biological yield, spike weight, peduncle weight at pollination stage, grain weight pre spike and weight of the leaves, except flag leaf. In leaves defoliation (except flag leaf), results showed that the differences among genotypes under normal and stress condition regarding spike weight, grain number per spike, biological yield, peduncle weight, and flag leaf weight were significant.

Keywords: wheat; drought stress; grain yield; biological yield; flag leaf defoliation.

GENETIC DIVERSITY AMONG SOME RICE GENOTYPES WITH DIFFERENT DROUGHT TOLERANCE BASED ON SSR MARKERS

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ABSTRACT. Rice is the most important food crop for the developing world. Hence, identifying rice genotypes to drought tolerance for using as donors in breeding is one of the most important challenges for rice research. Therefore, Molecular markers are useful tools to determine genetic diversity and identifying rice genotypes to drought tolerance. In the present study, A number of 41 rice genotypes with different drought tolerance from different geographic locations were evaluated for genetic diversity by using 15 SSR markers. A total of 68 alleles were detected of which 61(89.79%) were polymorphic. The number of alleles

detected by a single marker varied from 2 to 8 alleles with an average of 4.71 alleles per locus. The polymorphic information content (PIC) values ranged from 0.07 (RM219) to 0.80 (RM263) with an average of 0.52. Genetic similarity coefficients of pair wise comparisons were estimated on the basis of the polymorphic microsatelite loci ranged from 0.23 to 0.91 indicating a wide range of genetic variation present among the studied genotypes. It was determined that the primers RM20A, RM302, RM212 and RM286 could be useful for selecting drought tolerant lines through MAS approach. The most significant application of these identified major QTLs for drought tolerance is to collect those favorable alleles into elite local line through marker assisted breeding. The results indicated the ability of SSR markers to identify the allelic diversity and genetic variation among the studied rice genotypes. These results recommended for using this material in future breeding programs to provide important source of genetic diversity for drought tolerance in rice.

Keywords: genetic variability; drought; molecular markers; *Oryza sativa*.

PROLINE, SOLUBLE SUGAR, LEAF STARCH AND RELATIVE WATER CONTENTS OF FOUR MAIZE VARIETIES IN RESPONSE TO DIFFERENT WATERING REGIMES

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ABSTRACT. The purpose of this study was to evaluate the response of four maize varieties to different simulated watering regimes in term of proline, starch and soluble sugar contents as well as relative water content. Maize seeds were planted in 64 plastic pots of 20 litre capacity, arranged in a factorial fitted in completely randomized design (CRD), with four replications in the screen house of the Institute of Agricultural Research and Training (I.A.R&T), Moor Plantation Ibadan. The watering was done based on the designated field capacities (FC) of 25, 50, 75 and 100%. Fresh leaf samples were collected five weeks after planting and at the end of each stress period. The proline, soluble sugar, leaf starch and the relative water contents in the leaves were estimated. The results obtained showed that watering regime significantly influenced the leaf starch, soluble sugar, proline and relative water contents. The varieties also differ significantly in the proline, soluble sugar content, leaf starch and the relative water contents. Watering regime and variety interaction was significant for soluble sugar, starch, proline and the relative water content. Highest soluble sugar of 1.28 mg/g and proline of 35.70 µmol/g FW were obtained when FC was 25% and lowest when watering level was optimum. The starch and relative water contents were optimum under full watering (100% FC) and lowest when field capacity was 25%. Variations were observed with regards to different maize varieties. ART98SW6-OB accumulated the highest quantity of soluble sugar and proline under 25 and 50% field capacities alongside DTESYN, which is a drought tolerant maize variety. It could be concluded that water stress increased production of soluble sugar and proline, while water availability increases relative water content and favors starch accumulation. The consideration of these metabolites alongside other physiological features is a very fast and reliable method for drought tolerant plant selection even at the plant seedling growth stage.

Keywords: field capacity; proline; starch content; soluble sugar; relative water content.

INA GENE INACTIVATION IN ISOLATED STRAINS FROM FROZEN LEAVES AND ITS EFFECTS ON PLANT FREEZING

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ABSTRACT. Freezing is a major environmental stress, which limits plant's distribution, growth and productivity. Ice nucleation active bacteria can catalyze ice formation at temperatures as high as -2°C. A membrane protein confer the ability of ice nucleation, called ice-nucleating proteins (INPs), which is encoded by a single gene. Mutation in this gene will lead to delaying of ice nucleation. In this study, leaf tissues of several plants with freezing symptoms were collected from different locations and 40 bacterial isolates with yellow circular colonies and regular margins were isolated from samples. Finally, total of 12 isolates belong to *Xanthomonas* were selected for ice nucleate activity (INA) by Droplet-freezing test and presence of INA gene was surveyed by PCR. According to the obtained results, isolate 28 was targeted to mutagenesis by using Tn5 transposon. After mutagenesis, isolates with ability to grow on kanamycin, which lack of INAx gene in PCR were considered as mutated isolates and their freezing effects were evaluated on bean seedlings. Results showed that isolates with mutated INA gene cannot induce freezing on bean seedlings, while primary identified isolate (isolate 28) could do it. These results show that if we could replace wild type ice nucleation active bacteria with mutated forms (just different in ice nucleation activity), we could, probably, prevent freezing and subsequent economic losses.

Key words: freezing stress; ice nucleating protein; mutagenesis; transposon; *Xanthomonas*.

FUNGUS EVALUATION FROM SEEDS GERMPLASM BEFORE MEDIUM AND LONG TERM STORAGE

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ABSTRACT. During 2000-2016, 213 entries from 29 plant species from different crop groups (cereals, legumes, industrial crops, perennial grasses, vegetables, cucurbits, aromatic and medicinal plants) from core collection of the Suceava Genebank were evaluated from phytosanitary status point of view, before the storing. The seeds testing to the   micromycetes incidence in the laboratory by incubating of them on blotting paper substrate and agar medium was performed. Fungal saprophytes from genus as: *Alternaria* spp*., Stemphylium* spp*., Cladosporium* sp*., Rhyzopus* sp*., Epicocum* sp., *Aspergillus* sp., *Penicillium* sp., *Botrytis* sp. occurred frequently in seeds samples of the tested crops. Also, 12 fungal parasite were isolated: *Sclerospora* sp., *Diplodia* sp., *Nigrospora* sp. on maize; *Drechslera* spp. on wheat, barley, rye and flax; *Septoria* sp. on barley; *Fusarium* spp. on maize, barley, rye, millet, bean, pea, flax, hemp, peppers, cucumbers; *Colletotrichum* spp. on maize, bean and faba bean; *Sclerotinia* sp., *Isariopsis* sp. and *Rhyzoctonia* sp. on bean; *Verticillium* sp. on peppers and okra, *Ascochyta* sp. on pea. The obtained results were expressed as percentage of the number of fungal isolated from tested samples species, highlighting the existing microflora and need to seed health testing with major importance in maintaing of high quality germplasm avoiding the pathogens preservation and dissemination.

Keywords: germplasm; micromycetes; micoflora; parasite; saprophyte.

REZUMAT. Evaluarea fungilor din germoplasma seminţei înainte de depozitare pe termen mediu şi lung. În perioada 2000-2016, 213 intrări de la 29 de specii de plante s-au evaluat privind starea fitosanitară înainte de conservare. Materialul genetic studiat a fost reprezentat de genotipuri din grupe fito-horticole, ca: cereale, leguminoase pentru boabe, plante textile, graminee perene, legumicole (solano-fructoase, bostănoase, verdeţuri, aromatice şi codimentare), medicinale, din colecţia activă a Băncii de Resurse Genetice Vegetale Suceava. Testarea seminţelor la incidenţa micromicetelor s-a efectuat în laborator prin incubarea acestora pe substrat de sugativă şi mediu agarizat. Micromicetele saprofite din genurile *Alternaria* spp., *Stemphylium* spp., *Cladosporium* sp., *Rhyzopus* sp., *Epicoccum* sp., *Aspergillus* sp., *Penicillium* sp., *Botrytis* sp. s-au manifestat frecvent în probele de seminţe ale speciilor testate. De asemenea, s-au izolat 12 genuri de micromicete parazite, ca: *Sclerospora* sp., *Diplodia* sp., *Nigrospora* sp. pe porumb, *Drechslera* spp. pe grâu, orz, secară şi in, *Septoria* sp. pe orz, *Fusarium* spp. pe porumb, orz, secară, mei, fasole, mazăre, in, cânepă, ardei, castraveţi, *Colletotrichum* ssp. pe porumb, fasole şi bob, *Sclerotinia* sp., *Isariopsis* sp., *Rhyzoctonia* sp. pe fasole, *Verticillium* sp. pe ardei şi bame, *Ascochyta* sp. pe mazăre. Rezultatele obţinute s-au exprimat procentual din numărul de colonii de micromicete izolate, din probele speciilor testate, evidenţiind micoflora existentă şi necesitatea efectuării testelor de sănătate a seminţei, cu importanţă majoră în păstrarea unei germoplasme de calitate înaltă, evitând conservarea şi diseminarea patogenilor.

Cuvinte cheie: germoplasmă; micromicete; micoflorǎ; parazit; saprofit.

SMALL GRAIN CEREAL–CLOVER MIXTURES FOR FORAGE PRODUCTION

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ABSTRACT. Fresh forages are the cheapest source of animal feed in world. Small grain cereals (SGC) are the most commonly used fresh forages or ensiled forage. Clovers are the perennial legumes that offer quality forage but their initial dry matter (DM) yield is low. Usually, SGC and clover are sown in mixtures to draw benefits from greater Cut-1 DM yield of cereals and biological nitrogen (N) fixation of clovers. However, mixtures are difficult to manage, compared to monoculture owing to differences in their growth pattern, temporal, spatial and physical requirements. In this review, SGC-clover mixtures are analyzed for their potential herbage DM yield and quality of the produce. Effect of various management factors on the productivity of forage mixtures are well documented. Decisions in managing mixtures, like choice of cereal and cutting time and how they affect the value of the final produce is reviewed. Besides decision, effect of relative proportion and spatial arrangement of intercrops is also deliberated. Special attention is paid to the competition between SGC and clovers and its impact on clover suppression in mixture. At the end conclusions are drawn to optimize production from mixtures.

Keywords: clover regrowth; competition; cutting time; relative proportion; spatial arrangement.

ASSESSMENT OF CONSUMER PREFERENCES ON TABLE GRAPES OF NEW *VITIS VINIFERA* L. CULTIVARS

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ABSTRACT. Studying consumer behaviour became a concern of grape producers and grapevine breeders since they can learn how consumers choose their products and which are the factors influencing their choice. In this study, 98 respondents from Iași County, NE of Romania, aged between 18 and 61 years and grouped in four age categories, were surveyed in order to determine through sensorial analysis their perception on table grapes of seven new *Vitis vinifera* L. cultivars created in Romania. Respondents' perception differed with age category. Subjects between 18 and 27 years were the most demanding, grape colour uniformity and aromas being considered very poor. Contrariwise, seeds perception and skin thickness were not assessed as negative features. Respondents from 28 and 35 years appreciated positively the grapes of Napoca and Gelu cultivars, aromatic sensation being noted as very intense for most cultivars. The 36-45 years group considered that grapes of studied cultivars have neutral aroma and seeds perception is unpleasant, grapes of Cetățuia cultivar being preferred. Respondents between the 46-61 years age group rated positively the grapes of Transilvania and Napoca cultivars, especially for the intensity of aromatic sensation, colour and bloom uniformity. Mean data analysis, revealed that the respondents preferred black grapes with lighter and uniform shades of colour, with large and crunchy berries covered by a uniform wax layer, a balanced sugar/acidity ratio and fewer seeds, grapes of Transilvania cultivar being the closest to their demands. The study revealed that table grapes of the studied *V. vinifera* L. cultivars created in Romania possess valuable features highly appreciated by consumers and superior characteristics, that can be further use in vine breeding programmes.

Keywords: respondent survey; age groups; sensorial analysis; table grapes; autochthonous cultivars.

REZUMAT. Evaluarea preferinţelor consumatorilor privind strugurii de masă ai unor soiuri noi *Vitis vinifera* L. Studierea comportamentului consumatorului a devenit o preocupare a producătorilor de struguri şi a amelioratorilor, fiind observat modul în care cumpărătorii îşi aleg produsele şi care sunt stimulii şi factorii care le influenţează alegerea. În studiul de faţă, 98 de respondenţi din judeţul Iaşi, cu vârste între 18 şi 61 de ani, grupaţi în patru categorii de vârstă, au fost chestionaţi în vederea determinării prin analiză senzorială a percepţiei acestora asupra strugurilor de masă, proveniţi de la şapte soiuri noi *Vitis vinifera* L., create în România. Percepţia respondenţilor a variat în funcţie de categoria de vârstă. Subiecţii cu vârste între 18 şi 27 de ani au fost cei mai exigenţi, uniformitatea culorii strugurilor şi aroma acestora fiind considerate deficitare. În mod contrar, percepţia seminţelor şi grosimea pieliţei nu au fost evaluate ca negative. Respondenţii din grupa 28-35 de ani au apreciat pozitiv strugurii soiurilor Napoca şi Gelu, senzaţia aromatică fiind notată ca foarte intensă pentru majoritatea soiurilor. Grupul cu vârste între 36 şi 45 de ani a considerat că strugurii au o aromă neutră, iar percepţia seminţelor a fost neplăcută, fiind preferaţi strugurii soiului Cetăţuia. Respondenţii din grupa 46-61 de ani au notat pozitiv strugurii soiurilor Transilvania şi Napoca, în special pentru intensitatea aromatică, uniformitatea culorii şi a stratului de pruină. Analiza datelor medii a relevat faptul că respondenţii au preferat strugurii negri cu nuanţe mai deschise şi uniforme ale culorii, cu boabe mari şi crocante, acoperite de un strat uniform de pruină, un raport zaharuri/aciditate echilibrat şi cu puţine seminţe, strugurii soiului Transilvania fiind cel mai apropiat de cerinţele acestora. Studiul a indicat că strugurii de masă, provenind de la noile soiuri *V. vinifera* L. create în România, posedă caracteristici valoroase, foarte apreciate de către consumatori, şi pot fi utilizaţi, ulterior, în programele de ameliorare a viţei de vie.

Cuvinte cheie: investigarea respondenţilor; grupuri de vârstă; analiză senzorială; struguri de masă; soiuri autohtone.

STUDY OF THE ANTI – PREGNANCY - ASSOCIATED GLYCOPROTEIN (ANTI – PAG) RESULTED FROM ANTIGEN PAG IMMUNIZATION, AS PROSPECTIVE EARLY PREGNANCY DETECTOR IN ANIMALS

Tita Damayanti LESTARI

ABSTRACT. Blastocyst protein named pregnancy-associated glycoprotein (PAG) has been isolated from pregnant dairy cow serum. PAG yielded from previous research issued from pregnant animals, wherein was specifically produced. This study is an initial research to use PAG as an antigen to be injected to rabbit in order to produce the corresponding antibody. The objective of the research was to study the character of anti-pregnancy-associated glycoprotein (Anti-PAG), as a result of immunization of PAG and to learn its specification reaction. The PAG isolate had bovine origin (molecular weight-MW of 67.34 kDa) and issued from previous research. Injection of PAG isolate could stimulate the production of Anti-PAG as an immunization response. Immunization was done by double booster inoculation. Anti-PAG derived from immunization was characterized via antibody titer value using ELISA technique. Specificity test of Anti-PAG was carried on by Western Blot technique. Results revealed that injection of PAG isolate to the rabbit stimulates anti-PAG production. Concentration of Anti-PAG was 1.192 µg with titer of 1.044. Anti-PAG derived from rabbits recognized Standard PAG antigen (bovine PAG MDBiomed cat. 101-7963-13-3) and PAG isolate derived from previous research. The reaction of antigen antibody is the basic structure of creating a gestation detection kit. Anti-PAG is expected to be the molecular marker in developing a gestation detection kit in the near future.

Keywords: protein pregnancy-associated glycoprotein (PAG); cow serum; immunization; rabbit; Anti-PAG.