

RECLAMATION OF HIGH RESIDUAL SODIUM CARBONATE WATER WITH COMMERCIAL SULPHURIC ACID FOR SUSTAINABLE CROPPING AND SOIL CONSERVATION

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ABSTRACT. A study was carried out in field experimental area of directorate of land reclamation Punjab, Lahore, to investigate the effect of experimentally quantified commercial sulphuric acid (76%) on residual sodium carbonate (RSC) of water, soil quality and crop yield. The findings were clear indications of effectiveness of acid injection approach to treat water. The sulphuric acid application reduced the RSC value of 6.1 to nil by making (T₂) slight change in EC of water. This treated water not only improved the soil quality by decreasing its calcareousness from 20 to 17.2 making soil soft while the same increased to 23 in control (T₁), where not acid amendment was done. Similarly, SAR of soil was also restricted from an increase by acid treated water rather than the control set of experiment. To make RSC nil, 5.19 liters of sulphuric acids were injected in water for 3 acre inch irrigation. An increase of 16.65% in grain yield of wheat crop was observed upon harvesting in T₂, in comparison with control. Ascorbic acid and total phenolic contents (TPC) were also high in T₂, followed by T₃ and T₁. All the changes in soil parameters and crop yield were found statistically significant.

Keywords: RSC; ground water; sulphuric acid; wheat crop; sustainability.

THE EFFECT OF IRRIGATION INTERVALS SCHEDULING AND NITROGEN AND ZINC CONTENT ON WHEAT YIELD AND YIELD COMPONENTS IN DROUGHT STRESS

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ABSTRACT. In order to evaluate the effect of irrigation interval on yield and quantitative-qualitative characteristics of bread wheat, splitted plot experiment in randomized block with four replications in the 2010-11 crop years was conducted in the research field of Islamic Azad University of Gonabad. A number of 7, 9 and 10 days irrigation treatments formed the main factors of test, and spraying and non-spraying of nitrogen and zinc were considered as subfactor of test. The results showed that the effect of irrigation was significant for the number of grains per spike in the level of 5% and on 1000-grain weight and fat percent at the level of 1%, and had no significant effect on grain yield, biological yield, number of spikes/sq m stem height, stem diameter and protein content. Nitrogen treatment was significant at the level of 5% on biological yield and number of spikes/sq m, but had no significant effect on grain yield, number of grains per spike, 1000-grain weight, stem height, fat and protein percent, and stem diameter. Treatment with zinc was statistically significant in probability level of 1% only on percentage of fat and had no significant effect on grain yield, biological yield, grain numbers per spike, weight of 1000 seeds, spikes/sq m, stem height, protein percent and stem diameter. Seven days irrigation with of nitrogen allocated for highest seed yield (265.38 g/m²/sq m) and biological yield (659.33 g/m²/sq m). Means comparison showed the highest 1000-grain weight was obtained from 7 days irrigation (47.10 g) and the lowest from 13 days irrigation (40.44 g). According to the experiment results, 7 days irrigation was recognized as the best irrigation to achieve maximum economic performance and 13 days irrigation were determined as most

appropriate irrigation for maximum performance for the region due to lack of water and weather conditions of Gonabad, spraying zinc and nitrogen to improve production was proposed depending on different irrigation and the purpose of production.

Keywords: nutrients; spraying; wheat; irrigation.

GA₃ ASSISTED SEED DORMANCY BREAKING IN *ABELMOSCHUS MOSCHATUS* MEDIK. SUBSP. *MOSCHATUS*

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ABSTRACT. *Abelmoschus moschatus* Medik. subsp. *moschatus* is a wild uncultivated variety of common lady's finger (*Abelmoschus esculentus*) possessing a high degree of seed dormancy. Methods of dormancy breaking in the seed of the plant were investigated through different physical and chemical methods. Different preconditioning treatments including hot water, dry heat, physical scarification and chemical treatments including exogenous GA₃ were applied to explore the initiation in germination. Seeds were germinated under the controlled photoperiod and temperature. The viability of the test seeds was estimated by topographical 2, 3, 5-Triphenyltetrazolium chloride (TTC) solution test. Highest germination percentage was obtained in the seeds treated with the exothermic reaction of H₂SO₄ and H₂O, followed by exposure to gibberellic acid (GA₃). The exposure time of exogenously applied GA₃ had a significant influence on the germination response. The optimum germination temperature was found to be 30 ± 0.5°C. Treatment with 0.75% of 2, 3, 5-Triphenyltetrazolium chloride solution for 4 h at 35 ± 0.5°C enabled to correlate the viability of the seeds with the germinative values. Maximum germination was induced through this technique and dormancy of the seed can be attributed due to hard impermeable seed coat and endogenous physiological factor.

Keywords: dormancy; scarification; seed coat; germination; GA₃.

EFFECT OF FOLIAR APPLICATION WITH SALICYLIC ACID ON SOME MORPHOLOGICAL AND PHYSIOLOGICAL CHARACTERISTICS OF SESAME (*SESAMUM INDICUM* L.) UNDER DROUGHT STRESS

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ABSTRACT. Drought is an important factor that could restrict plants growth and productivity through several biological and physiological processes. Salicylic acid (SA) has a key role in many physiological processes of plants and stimulate specific responses against various stresses biotic and abiotic, in some of plants. In order to evaluate the effect of foliar application by salicylic acid (SA) under drought stress on some morphological characteristics sesame, a split-plot experiment with a completely random design with three replications was performed. There were three levels of irrigation: control (normal irrigations), water stress at flowering stage and water stress at seed production stage, as main plot and sub plot consisting of four levels of the foliar application of salicylic acid: 0 (control), 1, 1.5 and 2.25 mM. Results indicated that the effects of water stress on traits, such as plant height, height of first capsule from soil surface, number of branches, number of capsules per plant showed significant difference at a level of 1%, while on the number of seeds per capsule, seed weight, leaf area

index, biological yield, grain yield sesame, without significant difference indicated. Foliar application with salicylic acid was not so significant ($P < 0.05$) at different concentrations on measured traits, as well as interactive effects between drought stress and different amounts of salicylic acid, without significant difference observed.

Keywords: salicylic acid; water stress ; irrigation; sesame (*Sesamum indicum* L.).

PERFORMANCE OF PEPPER SEEDLINGS DEVELOPED FROM SEEDS PRETREATED WITH ALGAL AQUEOUS EXTRACTS

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ABSTRACT. This study aims to evaluate the effect of seed priming for two pepper varieties by extracts of two algae thalli on the performance of growth at vegetative stage. The seeds were soaked in thalli aqueous extracts (at 20, 40, 60, 80 and 100 g/L), for 24 h at $28 \pm 2^\circ\text{C}$, rinsed thoroughly with distilled water and then dried to their initial weight as a first batch (SD), a second batch of seeds was considered, corresponding to seeds placed in Petri dishes to germinate directly after washing (SND). Untreated seeds were the control. The results showed that the priming has improved seedlings growth for both varieties. Seed priming with algae aqueous extracts has improved roots and shoots length. The best stimulations were 220% and 70%, respectively, recorded for seedlings of Baklouti and Chargui varieties, following the priming with the extract of *Padina pavonica* at 40 g/L concentration. These improvements appear to be related to a better photosynthetic intensity, an increase in the number of leaves and the water content, which were noted in plants from pretreated seeds. Finally, the results indicate that, generally, the plantlets from SND were more vigorous. The results of this work show that algae could be an inexhaustible resource of substances, that can be used as an alternative to chemicals used in the pretreatment of seeds, reducing the risk of pollution and preserving the biological material.

Keywords: *Capsicum*; priming; aqueous extracts; algae; growth.

QUALITY OF RICE GRAIN IS INFLUENCED BY ORGANIC AND INORGANIC SOURCES OF NUTRIENTS AND ANTIOXIDANT APPLICATION

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ABSTRACT. The present research was conducted to study the influence of organic and inorganic sources of nutrients as well as antioxidant on rice quality. The experiment was designed in split-split plots with four replications, where main plots were assigned to nitrogen (0, 55, 110 and 165 kg N ha^{-1}) and sub plots were allocated to compost (0, 3.5 and 7 tons ha^{-1}), while the sub-sub plots were assigned to ascobien (control, spraying with ascobien in two times at 15 and 30 days after transplanting (DAT), spraying with ascobien three times at 15, 30 and 45 DAT). The result indicated that grain quality traits were significantly influenced by the organic and inorganic fertilizers, and ascobien. The percentage of hulling, milling and amylose were positively and significantly influenced by nitrogen, organic and antioxidants application. Most of studied characters produced the highest values with the

organic fertilize were combined with nitrogen and antioxidants. Application of 110 kg N ha⁻¹, 7 t ha⁻¹ compost and two or three spraying of ascobien, 110 kg N ha⁻¹ or 3.5 t ha⁻¹ compost and three times spraying and 55 kg N ha⁻¹, 7 t ha⁻¹ compost and two times spraying could be recommended for optimum grain quality of Sakha106 rice variety. It can be concluded that compost along with the foliar application of ascobien can be saved from 50 to 110 kg N ha⁻¹, without reducing grain quality. It can be the key to reduce the need for chemical fertilizers and decrease the cost of production with keeping healthy soil.

Key words: ascobien; grain quality; nitrogen; *Oryza sativa*; rice straw compost.

EFFICACY OF DIFFERENT FUNGICIDES AGAINST DRY ROT PATHOGEN OF POTATO CAUSED BY *FUSARIUM* SP. UNDER *IN VITRO* CONDITION

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ABSTRACT. Potato crop is affected by numerous diseases in field, as well as in storage conditions, particularly in cold storage. Dry rot of potato is caused by *Fusarium* sp. Dry rot of seed tubers can reduce crop establishment by killing developing potato sprouts, and crop losses can be up to 25%, while more than 60% of tubers can be infected in storage. It is a rich source of energy, which supplement food source of a country. In this experiment, four systemic and four non-systemic fungicides were tested at different concentrations *in vitro* for their comparative efficacy against inhibition of the growth of *Fusarium* sp. through poisoned food technique. To manage these diseases effectively, different concentrations of fungicides were tested. Results revealed against *Fusarium* sp. that carbendazim and benomyl significantly inhibited the fungal growth even at its lower concentration (100 ppm) and proved statistically superior over the rest of the fungicides tested at different concentrations and among non-systemic fungicides, MEMC significantly inhibited the fungal growth even at its lower concentration (1000 ppm).

Keywords: *Fusarium* sp.; dry rot; fungicides; inhibition.

MORPHOLOGICAL CHARACTERIZATION AND A MORPHOMETRY MAP FOR VARROA MITES FROM NORTHWEST OF EGYPT

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ABSTRACT. Varroa mite, *Varroa destructor*, is the most destructive factor to western honey bee colonies worldwide. In 1904, Varroa was firstly recorded on honey bees, at the beginning it was hypothesized that Varroa is one species but recently this hypothesis has been considered to be incorrect. In 1983, Varroa mite was recorded in Egypt for first time. So far, a single study was done in Egypt to confirm Varroa species to be *V. destructor* and not *Varroa jacobsoni* as it was previously thought. Still the exact haplotype of Varroa in Egypt is unknown. This study is a step towards the identification of Varroa in Egypt. Here, morphological investigations were performed on Varroa specimens belong to northwest Egypt (El-Behera governorate). Three

characteristics only showed significant differences among districts, namely body width, genital shield width, and genital shield length/ genital shield width (ratio II), while the rest of characteristics did not present any significant differences. The correlations among the characteristics were very weak, except body length which correlated significantly ($P < 0.05$) with body width and genital shield width by 0.52 and 0.42, in respect. The study presented additional confirmation that *V. destructor* is the current species infesting honey bee colonies in Egypt. Also, Varroa haplotype was identified to be the Korean one. A list of some morphological traits of Varroa mite was provided to enable further comparisons. A morphometry map for Varroa mites was also done using a geographical information system (GIS) to correlate between geographical locations and morphological characteristics. The morphometry map clearly classified studied districts, according to measured characteristics, into three classes as low, moderate and high. This study has a significant importance towards the fully understanding of Varroa populations in Egypt.

Keywords: honey bees; Varroa mite; haplotype; morphology.

BIOLOGY AND USE OF ENTOMOPATHOGENIC NEMATODES IN INSECT PESTS BIOCONTROL, A GENERIC VIEW

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ABSTRACT. The development of resistance to synthetic insecticides is one of the driving forces for changes in insect pest management. Governments regulatory bodies are in favour of environmentally safe chemicals with low toxicity, short-term persistence, and limited effects on non-target organisms as predominantly requirements for pesticides registration. Biological control can be considered as a powerful tool and one of the most important alternative control measure providing environmentally safe and sustainable plant protection. The success of biological control will depend on understanding the adaptation and establishment of applied biological control agents in agricultural ecosystems. Microbial pathogens and arthropod biocontrol agents, entomopathogenic nematodes (EPNs) have been successfully used in agricultural systems. They are highly virulent, killing their hosts quickly and can be cultured easily *in vivo* or *in vitro*. They are safe for non-target vertebrates and for the environment, and production costs have been significantly reduced in recent times as they are mass produced in liquid media. Moreover, no difficulties to apply EPNs as they are easily sprayed using standard equipment and can be combined with almost all chemical control compounds. EPNs are widely used to control economically important insect pests in different farming systems: from fruit orchards, cranberry bogs and turf grass to nurseries and greenhouses. The use of EPNs for biocontrol began only in early 1980s and involved a step-by-step scientific and technical development. Mass production of the nematodes played a key role in the commercially development of insect pests control with nematodes.

Keywords: efficacy; formation; entomopathogenic nematodes; Steinernematidae; Heterorhabditidae.

CRYOPRESERVATION OF BĂLȚATĂ CU NEGRU ROMÂNEASCĂ CATTLE IMMATURE OOCYTES BY SLOW FREEZING METHOD: PRELIMINARY RESEARCH

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ABSTRACT. Research on bovine oocytes cryopreservation is important for successful preservation of genetically valuable animal. The transvaginal ultrasound-guided follicular puncture coupled with *in vitro* embryo production has become competitive and alternative method for MOET (Multiple ovulation and embryo transfer) in dairy cattle. The aim of this preliminary research is to present the result of Bălțată cu Negru Românească (BNR) cows oocytes recovery by two different protocols and its cryopreservation by slow freezing method. By applying the recovery oocytes from slaughterhouse ovary we obtained an average of 16.34 ± 6.71 oocytes per cow, much higher compared with the Ovum Pick Up (OPU) method, which reveals an average of 2.75 ± 0.2 oocytes per cow. After applying the slow freezing procedures using the ethylene glycol cryoprotectant we observed the oocytes with cumulus cells normal with the spherical shape and normal zone pellucida.

Key words: Bălțată cu Negru Românească cows; immature oocytes; slaughterhouse ovary; OPU; cryopreservation.

REZUMAT. Crioconservarea ovocitelor imature la bovinele din rasa Bălțată cu Negru Românească, utilizând metoda congelării lente: cercetări preliminare. Cercetările efectuate asupra crioconservării gameților femeli sunt importante pentru păstrarea cu succes a animalelor de mare valoare genetică. Recoltarea gameților femeli la specia bovină prin puncție transvaginală ecoghidată, asociată cu producere de embrioni *in vitro*, reprezintă, la ora actuală, o metodă alternativă și competitivă pentru ovulația multiplă, asociată embrio transferului. Scopul acestor cercetări preliminare constă în prezentarea a două metode standard de recoltare a gameților femeli, aplicate la rasa Bălțată cu Negru Românească, și crioconservarea lor prin utilizarea metodei de congelare lentă. Recoltarea gameților din ovarele provenite de la vacile sacrificate în abatoare a relevat o medie de 16.34 ± 6.71 gameți, superioară metodei de recoltare prin puncție transvaginală ecoghidată a foliculilor ovarieni (OPU – Ovum Pick Up), care a prezentat o medie de 2.75 ± 0.2 gameți. După aplicarea metodei de criocongelare lentă, prin utilizarea etilenglicolului ca și crioprotectant, s-au observat, după decongelare, gameți de formă sferică, înconjurați de celule cumulus normale și cu zonă pelucidă normală.

Cuvinte cheie: Vaci din rasa Bălțată cu Negru Românească; ovocite imature; ovare din abatoare; OPU; crioconservare.