

NUTRIENT UPTAKE AND YIELD OF WHEAT VARIETIES AS INFLUENCED BY FOLIAR POTASSIUM UNDER DROUGHT CONDITION

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ABSTRACT. Water stress experienced by a wheat crop during growth is recognized to have accumulative effect stated as a decline in total biomass over well water potential. The yield and nutrient uptake performance of two wheat (*Triticum aestivum* L.) varieties (Pirsabak-2013 and Atta Habib) to foliar feeding of 2% potassium (K) at three various growth phases (Zadoks GS-22, Zadoks GS-60 and Zadoks GS-73) was explored under water restricted environment in a wire house trial at the Agriculture Research Station, Harichand, Charsadda. The target was to find out the preeminent K application stage for enhancement in the drought tolerance potential. Drought stress was generated by suppression of irrigation at the three growth phases and then K was sprayed with the carboxymethyl cellulose as a sticking agent, however Tween-20 was used as a surfactant for foliar spray. Data about several agronomic characters (plant height, spike length, number of spikelets per spike, number of grains per spike, 1000-grain weight and grain yield per plant) of crop were documented via standard techniques. Moreover, at maturity, aboveground nitrogen, phosphorus, K, sodium and calcium uptakes by the crop were determined. The results point out that drought stress at all three acute growth phases unfavorably affected plant height, spike length, number of spikelets per spike, number of grains per spike, 1000-grain weight, grain yield and nutrient uptake of the wheat plant. The exogenous K application under drought stress at all three acute growth phases boosted tolerance of wheat by decreasing noxious nutrient's uptake and augmenting the yield and yield characters. In this concerns, both varieties exposed undeviating behavior. Extreme enhancement in all the documented yield parameters and nutrients uptake was attained when K was practiced at grain filling stage of both varieties.

Keywords: macro nutrients uptake; water stress; potassium; yield, wheat.

SEEDLING ESTABLISHMENT, BIOMASS YIELD AND WATER USE EFFICIENCIES OF FOUR MAIZE VARIETIES AS INFLUENCED BY WATER DEFICIT STRESS

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ABSTRACT. Water stress is one of the major abiotic factors affecting crop growth and development at every growth stages. Effects of water deficit on the vegetative growth stage of four maize varieties consisting of two Quality Protein Maize varieties (ILE10B and ART98SW6OB) and two drought tolerant checks (TZPBSR and DTESTRSYN) were evaluated under the screen house conditions at the Institute of Agricultural Research and Training (I.A.R & T), Moor Plantation, Ibadan. Maize seeds were sown in 20 L plastic pots filled with 15 kg top soil, which were subjected to four watering regimes of 25, 50, 75 and 100% field capacities (FC). The experimental design was a 4 x 4 factorial fitted into CRD with four replications. Data were collected on days to germination, number of leaves per plant, leaf area, plant height, stem diameter, leaf extension rate, biomass yield and water use efficiency. The result showed that days to germination were prolonged as the moisture availability decreases, while water use efficiency increased as the moisture level reduced. Reduction in

moisture availability caused significant reduction in the other evaluated parameters. At 25% FC DTESTRSYN was superior in leaf area, number of leaves per plant, days to germination and water use efficiency, TZPBSR had highest values for stem diameter and biomass yield, while ILE1OB was superior in plant height, stem diameter, leaf and stem extension rate. ILE1OB competes favourably with the drought tolerant checks and performed better than ART98SW6OB. Adequate moisture condition is fundamental for normal growth and development in maize crops.

Keywords: biomass yield; days to germination; leaf area; plant height; water use efficiency.

YIELD POTENTIALITY OF MAIZE AS RELAY CROP WITH T. AMAN RICE UNDER DIFFERENT AGRONOMIC MANAGEMENT

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ABSTRACT. The experiment was conducted at the Regional Agricultural Research Station, BARI, Ishwardi, Pabna, Bangladesh, during 2013-2014 and 2014-2015 to introduce maize as relay crop with T. Aman rice under different agronomic practices for determine the production potentials. The experiment was design split plot with three replications. The agronomic management practices included four plant spacing viz. $S_1=75\text{ cm}\times 20\text{ cm}$ (66666 plants/ha), $S_2=60\text{ cm}\times 20\text{ cm}$ (83333 plants/ha), $S_3=50\text{ cm}\times 20\text{ cm}$ (100000 plants/ha) and $S_4=40\text{ cm}\times 20\text{ cm}$ (125000 plants/ha) and four soil management practices viz. M_1 =soil mulching at 25 DAE, M_2 =earthing up at 25 DAE, M_3 =straw mulching at 25 DAE and M_4 = without earthing up and mulching (control). Seeds were relayed by dibbling manually in 10 days before the harvest of T. Aman rice. Results showed that an increasing plant spacing increased leaf area Index (LAI), total dry matter (TDM), crop growth rate (CGR) and light energy interception (LEI). Grain yield was higher in S_3 spacing (8.44 t/ha) than others (S_4 8.11 t/ha, S_2 7.34 t/ha and S_1 6.89 t/ha). Among the soil management practices, M_2 increased LAI, TDM, CGR, LEI as well as grain yield. Moreover, M_2 and M_1 gave similar grain yield (8.22 t/ha and 8.02 t/ha), that were significantly greater than other two soil management practices (M_3 7.55 t/ha and M_4 6.98 t/ha). From the economic point of view, combination of S_3M_1 gave better performance with gross margin of Tk. 95000/ha and BCR of 2.17. On the basis of results, S_3M_1 combination was suitable for growing maize under relay sowing with T. Aman rice.

Keywords: relay maize; plant spacing; soil management; light energy interception; growth.

EFFECT OF GLYPHOSAT AND PARAQUAT HERBICIDES ON WEED CONTROL AND PRODUCTIVITY OF COTTON

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ABSTRACT. Weed control management has a vital role in increasing cotton yield and yield components. In cotton crop weed, infestation may harm significant growth and yield loses. To control the weeds under field conditions in cotton crop, different herbicides were selected with different dose levels. Response of various post emergence herbicides at different levels, i.e. Round up 490 G/L at the rate of 4.7 L ha^{-1} , 2.7 L ha^{-1} and 1.5 L ha^{-1} (Glyphosate), Gramoxone 20EC (Paraquat) at the rate of 2.5 L ha^{-1} and untreated (Control) were field experimented

against cotton cultivar CIM-473 under field condition at Agronomic Research Area of Central Cotton Research Institute (CCRI) Multan, Pakistan. Significant control of weeds, i.e. number of weeds m^{-2} , fresh weed biomass in $g m^{-2}$, dry weed biomass in $g m^{-2}$ and increase in yield and yield contributing factors, like number of bolls $plant^{-1}$, cotton boll weight (g), final cotton plant height (cm) and seed cotton yield ($kg ha^{-1}$) were observed. The field data for weed control in term of numbers, fresh and dry weight was observed after 10, 20 and 30 days of sowing. It was indicated that the highest significant yield, total number of bolls per plant, fresh weed biomass, dry weed biomass, plant height and weed control were obtained by using herbicide Round up (Glyphosate) at the rate of $4.7 L ha^{-1}$, as compared to the other treatments with different application rates including untreated (control). Average boll weight was not significant among treatments, but significant against control. Cost benefit analysis showed that the highest net profit was obtained by the Round up 490 G/L, when treated @ $4.7 L ha^{-1}$ than all other treatments.

Keywords: cost benefit analysis; *Gossypium hirsutum*; growth; yield; yield components.

EFFECTS OF NEEM SEED CAKE AND NPK FERTILIZER ON THE GROWTH AND YIELD OF SESAME (*SESAMUM INDICUM* L.)

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ABSTRACT. Soils of the southern Guinea savannah zone of Nigeria are low in organic matter content, inherently infertile due to intensive weathering and leaching caused by high temperature and rainfall. A field experiment was conducted at the Teaching and Research Farm of the University of Ilorin, during the 2013 and 2014 cropping seasons, to determine the effect of neem seed cake and NPK fertilizer on the performance of sesame crop (Ex Sudan cv). Treatments consisted of three levels of NPK fertilizer 20:10:10, applied at 0, 100 and 200 $kg ha^{-1}$ and neem seed cake (NSC), applied at 0, 1, 2, 3 and 4 $t ha^{-1}$. The experiment was laid out in a 3 x 5 factorial arrangement replicated thrice. Data were collected on soil parameters (some physical and chemical properties), plant growth parameters (plant height, number of leaves and leaf area) and yield components (number of capsules per plant, weight of seeds per plant and weight of seeds per hectare). The result of the study indicated that using the highest level of application of NPK fertilizer, neem seed cake and their combinations significantly ($p < 0.05$) increased the growth of sesame plants, in the 2 years of study. However, the 100 $kg ha^{-1}$ of NPK and 3 $t ha^{-1}$ and their combinations gave the highest yield and yield components of sesame during the period of study. The result of the study revealed that using high levels of NPK, neem seed cake and their combinations favoured vegetative growth at the expense of seed formation. Farmers are therefore encouraged to use organic and inorganic fertilizer moderately to prevent excessive vegetative growth of sesame.

Keywords: sesame; inorganic and organic fertilizers; vegetative growth; yield.

SEED YIELD INCREASE IN NIGER CROP IN TO RELATION TO HONEYBEE AND OTHER POLLINATORS

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ABSTRACT. Niger (*Guizotia abyssinica* Cass) is an important minor oilseed crop of hilly and tribal regions and it is used for oil as well as for various other purposes only by the tribal people. Therefore, a systematic study was arranged to document about the increase in the seed yield of niger crop in relation to honeybees (*Aphis mellifera*), as a pollinator in niger crop with paired plot technique at the Niger Research Station (NRS) at Navsari Agricultural University (NAU) and at farmer's field, Vanarasi, Navsari, Gujarat (India) and also studied its relation in terms of cost benefit ratio (CB). The trial was conducted at Niger Research Station (NRS), Vanarasi for 3 years (2013-14, 2014-15 and 2015-16) and also at farmer's field to ascertain the role and involvement of honey bees (*Aphis mellifera*) in swelling the seed yield of niger crop (due to pollination) and its effect on income due to increase in the niger seed yield. Significant differences were observed for number of capitula/plant, number of seeds/capitula, 1000 seed weight and seed yield in both the location for the consecutive 3 years. However, the seed yield and gross returns were considerably higher in first location of T₁ Natural plot/ open pollinated with beehive (*Aphis mellifera*) in all the 3 years data with the maximum seed yield with the gross return was obtained in this treatment.

Keywords: *Aphis mellifera*; pollination; oilseed; insect pollinator; pair plot technique.

EFFECT OF DIFFERENT NITROGEN DOSES ON SOME AGRICULTURAL CHARACTERISTICS AND ALKALOID CONTENT OF *HYOSCYAMUS RETICULATUS* L. AND *HYOSCYAMUS NIGER* L.

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ABSTRACT. Alkaloids, nitrogen containing basic substance, have a complex structure. They are one of the most important groups of secondary metabolites, which is synthesized in roots and transported to other organs. Since alkaloids are nitrogenous compounds, the availability of nitrogen is expected to play an important role in the biosynthesis and accumulation of alkaloids in plants. Nitrogen affects yield and quality of medicinal plants, therefore, growers usually apply large amount of nitrogen to obtain high yields. The objective of the present study was to determine yield, yield components and alkaloid content of two henbane species (*Hyoscyamus reticulatus* L. and *Hyoscyamus niger* L.), collected from wild flora of South-eastern Anatolia, grown under four nitrogen applications (0, 50, 100 and 200 kg ha⁻¹), in 2010-2011 growing seasons. In the field trial, plant height, stem diameter, number of branches per plant, number of capsule per plant, capsule width, capsule length, number of seed per capsule, 1000 seed weight, seed yield per plant and total alkaloid content were investigated. The results of study showed that nitrogen doses were found important for investigated characters but not important for *Hyoscyamus* species. Seed yield per plant varied from 8.4 to 11.6 g per plant, their alkaloid contents were found between 0.14% and 0.21%.

Keywords: henbane; herb yield; seed yield; total alkaloid content.

GEOGRAPHIC INFORMATION SYSTEM (GIS) AS A TOOL IN THE EPIDEMIOLOGICAL ASSESSMENT OF WETWOOD DISEASE ON ELM TREES IN TABRIZ CITY, IRAN

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ABSTRACT. Plants disease epidemiology provides us with some information about the spread of diseases in different regions with various climates and helps us conduct suitable managing operations and predictions about the spread of disease to other areas. Geographic Information System (GIS) has been widely used as an important tool in epidemiological studies. Wetwood disease is one of the most important bacterial diseases on elm trees found in the Northwest of Iran. The disease has spread in different regions of Tabriz (located in the Northwest of Iran), which has become terribly epidemic. Geographic Information System as an appropriate tool in epidemiological examination of plant disease is useful in various ways. In this study, the epidemiology of bacterial wetwood disease on elm trees in Tabriz was investigated using GIS databases. The results indicate that the disease has become epidemic in different areas of Tabriz. According to the results, although the disease was not found in some regions, its severity was very high in some other areas. Based on the distribution map, the wetwood disease most highly exists in the central regions and some parts of the northern regions of the city, but eastern regions are least affected.

Keywords: plant disease; epidemiological studies; bacterial wetwood; Iran.

ELAIIAȘI – NEW SWEET CHERRY CULTIVAR WITH HIGH PRODUCTIVITY AND MEDIUM RIPENING TIME

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ABSTRACT. The aim of this paper is to improve the autochthonous sweet cherry assortment with new cultivars of good adaptability and ecological plasticity, with superior biological potential, productive, with quality fruits and superior features, in comparison to existing cultivars. Due to the characteristic of having an earlier ripening age for the fruits compared to the other tree species (beginning in May), the cherry is the first ring in the annual chain of fruits production. On the fresh fruits market, the preferred ones are the cultivars type 'bigarreau', with shining red colour, resistant to cracking, transport and temporary storage with the weight of over 7 g. Analysing the main phenological stages for the two cultivars, it was noticed that the new sweet cherry cultivar 'Elaiiași' is average both in flowering beginning time and fruits maturation season. In regards to average productions for five years (2012 - 2016), from the statistical point of view, it was noticed that 'Elaiiași' (21.1 kg/tree) recorded production with insignificant positive differences in comparison to the witness cultivar 'Van' (20.2 kg/tree). Under the aspect of fruits' weight and equatorial diameter, 'Elaiiași' (8.8 g and, respectively, 25.1 mm) recorded significant and respectively positive significant differences, in comparison to the witness cultivar 'Van' (7.6 g and 23.9 mm). Concerning the fruit's resistance to cracking, 'Elaiiași' cultivar presented a superior resistance (2.7 %) to the witness cultivar 'Van' (42.0 %), recording distinct significant negative differences in comparison to this cultivar from the statistical point of view.

Keywords: sweet cherry; assortment; cultivars; fruit; quality.

REZUMAT. Scopul lucrării este de a îmbunătăți sortimentul de cireș autohton cu soiuri având o bună adaptabilitate și plasticitate ecologică, potențial biologic superior, productive, cu fructe de calitate și însușiri superioare soiurilor existente. Datorită însușirii de a avea o epocă de coacere a fructelor mai timpurie decât la celelalte specii pomicele (începând din luna mai), cireșul constituie prima verigă din lanțul anual al producției de fructe. Pe piața de fructe proaspete sunt preferate soiurile de tip “bigarreau”, de culoare roșie strălucitoare, rezistente la crăpare, transport și depozitare temporară, cu masa de peste 7 g. Analizând principalele stadii fenologice la cele două soiuri, s-a constatat că noul soi de cireș ‘Elaiși’ este mediu, atât în ceea ce privește începutul înfloritului, cât și cel al maturării fructelor. Referitor la producțiile medii pe cinci ani (2012-2016), din punct de vedere statistic, se constată că soiul ‘Elaiși’ (21,1 kg/pom) a înregistrat diferențe de producție pozitive ne semnificative față de soiul martor ‘Van’ (20,2 kg/pom). Sub aspectul greutatei fructelor și al diametrului ecuatorial, ‘Elaiși’ (8,8 g și 25,1 mm) a înregistrat diferențe semnificative (g) și semnificativ pozitive (mm) față de soiul martor ‘Van’ (7,6 g și 23,9 mm). Referitor la rezistența fructelor la crăpare, soiul ‘Elaiși’ a prezentat o rezistență superioară (2,7%) soiului martor ‘Van’ (45,0%), din punct de vedere statistic înregistrând diferențe distinct semnificativ negative față de acesta.

Cuvinte cheie: cireș; sortiment; soiuri; fruct; calitate.

CONSUMER DEMAND FOR BEVERAGES IN PAKISTAN

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ABSTRACT. This current research endeavors to study important factors having significant impact on consumer’s choice of beverages in Punjab province of Pakistan. Beverages in two major categories of ‘hot’ and ‘cold’ have been studied to examine consumer consumption pattern. Data has been collected through interview from 80 respondents belonging to two major cities of Punjab, i.e. Lahore and Faisalabad, by incorporating stratified random sampling technique. These two cities of Punjab were selected because of big departmental stores opening like Metro Cash and Carry store, Al-Fateh and others. A pre tested and well-arranged questionnaire was used for data gathering from respondents. To estimate the outcome of factors affecting choices of consumers (demand function), multivariate analysis was incorporated. Results of this research showed that consumption pattern of cold beverages was affected significantly by consumer income, cold beverages prices, city selected for survey and number of adolescents in a family, whereas factors which affected the consumption of hot beverages were food expenditure, living area, marital status, income, working persons in a family, family size. Due to availability of copious brands of beverages, consumption is escalating with the passage of time and consumers are eager to pay but owing to high rates they are not relishing full taste of beverages. So, local industry should produce cost effective and quality drinks to enhance usage.

Keywords: multivariate analysis; Metro Cash & Carry, AL-Fateh store; beverages.