EVALUATING THE POTENTIAL EFFECT OF SEED PRIMING TECHNIQUES IN IMPROVING GERMINATION AND ROOT SHOOT LENGTH OF MAIZE SEED

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ABSTRACT. The present research was conducted under laboratory conditions. The purpose of research was to investigate the potential of priming with press mud, peat moss, sand, gunny bags, compost, farm yard manure and moringa leaf extract (MLE) on seedling growth and germination capacity of maize seed. Untreated or non-primed seeds were used as a control treatment. Priming treatments improved germination capacity, stand establishment and seedling vigor, compared with control. Priming with moringa leaf extract enhance germination and seedling vigor of maize seed, compared with the control and other seed primed treatments. In moringa leaf extract primed seeds, root and shoot growth was improved. Overall, moringa leaf extract primed maize seeds performed better than all other treatments and it could be related by seedling vigor enhancement and lowering the mean germination time, due to imbibition of higher quantity of water and earlier enzymatic activity. The results propose that moringa leaf extract priming treatment had the potential to enhance germination, stand establishment and early growth of maize seeds.

Keywords: seed invigoration; moringa leaf extract; solid matrix priming; matriconditioning; osmotic priming; corn.

GERMINATION, GROWTH AND YIELD PERFORMANCE OF FLAX (*LINUM USITATISSIMUM* L.) UNDER GAMMA IRRADIATION STRESS

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ABSTRACT. Gamma irradiation is a widely manipulated mutation breeding approach in agriculture for producing crops with desired agronomic traits. The technique is particularly advantageous to conventional breeding methods because of minimal labor and time requirement. Under laboratory and field experiments during 2013, seeds of *Linum usitatissimum* L. were irradiated with 2, 4, 8, 12, 16, 20, 24, 28 and 32 krad of gamma irradiation doses from Co-60 source for evaluating their effects on germination, seedling survival, radicle and plumule lengths, vegetative growth and productivity. It was noted that radiation doses caused significant changes in the studied traits of test plant. Germination, radicle and plumule lengths in lab study while shoot length, number of leaves and leaf area, number of fruits plant^{-1}, number of seeds fruit^{-1}, husk weight fruit^{-1}, number of branches plant^{-1}, fresh and dry biomass and moisture content of shoots under pot culture varied significantly under the applied radiation stress. In general, radiation doses up to 8 kr had stimulatory effects on the studied parameters while doses exceeding 8 kr negatively influenced germination, growth and productive attributes of flax. Results observed both stimulatory and inhibitory effects of the irradiation doses. The study suggests that radiation doses above 32 krad induced lethal effects on general growth of flax.

Keywords: mutation; metabolic abnormalities, free radicals; nuclear technology; agricultural productivity.

PHYSICAL AND MECHANICAL PROPERTIES OF SOME PEANUT VARIETIES GROWN IN MEDITERRANEAN ENVIRONMENT

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ABSTRACT. Peanut is one of the most important oil crops in Turkey and grown mainly in Adana, Osmaniye and Aydın provinces. Five peanut cultivars (NC-V11, Halisbey, Arioglu 2003, Sultan and Osmaniye 2005), mostly grown in Turkey, were analyzed for the physical and mechanical characteristics of pods to select the most promising candidate. The average length, width, thickness, the geometric mean diameter, sphericity index and rupture force were studied. The results indicated that all the studied traits were varied significant among the varieties. Thus, a significant extent of genetic diversity was observed among the peanut cultivars under study. Shelling percentage values were varied between 65.7 - 71.6%. The highest shelling percentage was obtained at NC-V11 variety, while the lowest value was obtained at Sultan. The variety NC-V11, Halisbey, Arioglu 2003, Sultan and Osmaniye 2005 showed the average lengths of 42.27, 44.68, 46.17, 49.39 and 44.57 mm; width of 16.00, 17.90, 17.57, 17.45, and 17.92 mm; thickness of 17.33; 18.68; 18.54, 18.42, and 19.10 mm, respectively. Rupture force and stiffness values of peanuts depend on the cultivars and varied from 191.06 to 253.19 N and 129715.61 to 184954.67 N/m as higher and lower values, respectively. The varieties Arioglu 2003, Halisbey and Sultan have lower rupture force and stiffness values. On the other hand, NC-V-11 and Osmaniye-2005 varieties have higher value of rupture force and stiffness. These findings indicated that these two varieties need to more energy for hull rupture. But, in the same time, it played an important role for storage. The NC-V-11 variety achieved the highest values of rupture force than others. Some varieties had thick and strong hull, while some other had thin and weak.

Keywords: peanuts; stiffness; rupture force.

GERMINATION OF BLACK GRAM (*VIGNA MUNGO* L.) SEED IS INFLUENCED BY DIFFERENT STORAGE CONTAINERS AND STORAGE PERIODS

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ABSTRACT. A laboratory test was carried out to examine the influence of various storage containers and periods on the germination percentage of black gram seed. In this research, three seed containers, *viz.* sealed tin container, poly bag and gunny bag were used to store the seeds, as well as seeds were stored for three different storage periods, *viz.* 15, 30 and 45 days and thereby conducted germination tests. The results revealed that storage and storage periods considerably influenced the germination percentage (GP) of black gram seed. The highest GP of 87.73% was found in the seeds stored at sealed tin container, while the lowest GP (71.08%) was observed in the seeds stored in gunny bag. Among the three storage containers, the GP reduced rapidly in the seeds stored in gunny bags (6.52%), followed by poly bag (18.98%). The maximum values of GP (85.43%) of black gram seed were recorded when 15 days after storage (DAS), whereas the lowest GP (68.33%) was at 45 DAS, and the GP decreased noticeably with the increase of storage periods from 15 to 30 and to 45 DAS. In combination influence of storage containers and storage periods, the maximum GP (85.90%) was recorded at when seeds kept in sealed tin container with stored for the shortest duration (15 DAS), while the minimum (58.11%) was recorded in the seeds stored in gunny bag for the longest period

with 45 DAS. Seeds stored in the sealed tin containers exhibited an excellent performance regarding GP with the shortest storage periods and, thereby, black gram should be kept in sealed tin containers or like this air tight containers for storage, as well as seeds should be sun dried after a short period for maintaining seed quality.

Keywords: *Vigna mungo*; seed storing pots; seed storage duration; germinability.

IMPACT OF BIO-FERTILIZER OR NUTRIENT SOLUTION ON SPINACH (*SPINACEA OLERACEA*) GROWTH AND YIELD IN SOME PROVINCE SOILS OF P.R. CHINA

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ABSTRACT. A study was conducted to assess the effects of a bio-fertilizer and an inorganic fertilizer on growth, yield of spinach vegetable, on four cultivated soils, representing different agro-ecological zones of Chengdu, Hunan, Xiaotangshan and Shaanxi. Three replicates soil samples mixed with bio-fertilizer 100 g per pot and nutrient solution ($MgSO_4$, $Ca(NO)_2$, KNO_3) 633 ml based on container volume. Spinach seeded directly ten per pot, thinned to five watered to plant water requirement until maturity. RCBD of three replication used, data for growth, yield and other agronomic characters and soil physicochemical properties evaluated. Soil results showed substantial differences in physicochemical properties from the four agro-ecological zones (Ferrod Arenosol, Entisol, Aridisol and Vertisol). Plant emergence percent were Xiaotangshan (74.8%), Chengdu (74.5%), Hunan (72.4%) and Shaanxi (70.7%), plant height at six week, Xiaotangshan (17.8 cm), Hunan (17.1 cm), Shaanxi (16.8 cm) and Chengdu (16.1 cm) the least, number of leaves at six weeks were Xiaotangshan (21), Hunan (19) and (16) Shaanxi, leaf area Hunan (89.5 cm²), Shaanxi (83.7 cm²), Chengdu (79.4 cm²) and Xiaotangshan (78.1 cm²), dry biomass of 4.88, 4.35, 3.83 and 3.03 g obtained for Hunan, Chengdu, Shaanxi and Xiaotangshan, respectively. Percentage plant emergence based on soil layers were 0-25 cm (75.8%), 25-50 cm (75.3%), 50-75 cm (71.6%) and 75-100 cm (69.6%), respectively; highest plant emergence percentage were obtained from top soil layer of Hunan, treated with bio-fertilizer. Substantial differences were observed for plant height, biomass and other agronomic characters in all the soils. The results show that Hunan soil is the most suitable for cultivation of spinach under bio-fertilizer treatment, compared to other types. The study underpins the importance soil types and fertilizer evaluation for a sustainable vegetable production in China.

Keywords: inorganic fertilizer; physicochemical properties; dry biomass; agro-ecological.

EVALUATION OF YIELD AND SOME OF PHYSIOLOGICAL INDICES OF POTATO CULTIVARS IN RELATION TO CHEMICAL, BIOLOGIC AND MANURE FERTILIZERS

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ABSTRACT. In order to evaluate yield and some of physiological indices of potato cultivars in relation to different kinds of manures, strip plot layout within a randomized complete block design with three replications was used. Three levels of fertilizer were included manure (t/ha) (20, 40 and 60 t/ha), biologic fertilizer (ml/ha) (0, 100 and 200 ml/ha), and chemical fertilizer

(kg/ha) (175, 350, and 525 kg/ha). Cultivars were Marfona, Maradona and Ramus. Marfona had obtained the maximum plant height, total dry matter, LAI, tuber yield, dry matter of tuber, the number of tuber and tuber weight. Application of 60 t/ha manure fertilizer together with Marfona produced the highest yield. In this experiment, fertilizer showed significant effects on potato cultivars yield and physiological indices. Marfona and Ramus had obtained the highest and the lowest total dry matter, respectively. The maximum LAI was related to application of 60 t/ha manure fertilizer, and the minimum one was obtained for application of 40 t/ha manure fertilizer. In cultivar treatments, the highest LAI was obtained for Marfona, followed by Maradona and Ramus. The maximum and the minimum crop growth rate (CGR) was related to chemical and biological fertilizer, respectively. The maximum CGR was related to Marfona, than those of other cultivars. There were not any significant differences among different fertilizers in net assimilation ratio (NAR), fertilizer levels and various cultivars. Thus, it can ve suggested that in order to increasing yield, total dry matter, crop growth rate and other physiological indices should be applied 60 t/ha manure fertilizer with Marfona cultivar in Fereydan region of Esfahan, Iran.

Keywords: LAI; CGR; NAR; total dry matter; tuber weight.

EFFECT OF LAST CUTTING DATES ON SEED PRODUCTION OF MULTICUT MB-87 – A VARIETY OF PEARL MILLET, *PENNISETUM GLAUCUM* (BAJRA)

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ABSTRACT. Pearl millet (*Pennisetum glaucum*) is considered an important kharif crop, which is grown extensively in the arid and semi-arid tropical regions, where other crops, like sorghum and maize, fail to produce economic yields. Its grains are valued as human food, while its dry stover makes significant livestock ration in crop-livestock farming system. Pearl millets (MB-87), a newly developed variety of Fodder Research Institute, Sargodha, Pakistan, is one of the best pearl millet variety, which gives more than one cutting and helps to cope with fodder lean period, as well as more income can be generated in addition to seed. So, overcome the scarcity period the study was conducted to check the effect of last cutting dates on seed production of multicut pearl millet MB-87 was conducted at Fodder Research Institute, Sargodha, Pakistan, during 2015 and 2016. Following parameters were taken in to consideration, *i.e.* plant height (cm), stem thickness (cm), number of leaves per tiller, number of tillers per plant, green fodder yield (t/ha), length of head (cm), 1000 grains weight (g) and grain yield (kg/ha). The results depicted that grain yield, *i.e.* 319.20, was maximum and head length was highest, *i.e.* 35.13 cm on 20th of August having last date of cut, whereas all others parameters were found to be non-significant. Multicut bajra gives three cutting of fodder, followed by seed, as compared with conventional bajra, which gives only one cutting or seed. Therefore, it is more economical for the growers of fodders to grow the pearl millets MB-87 as fodder, as well as for seed purposes. So, it is concluded that for gaining maximum grain yield of multicut pearl millet MB-87 the last cutting date should be 20th of August. In future, pearl millet is likely to play a larger role in providing food and nutritional security.

Key words: pearl millets; MB-87; grain yield; fodder yield; production; Punjab-Pakistan.

ESSENTIAL OIL COMPOSITION OF *THYMUS FEDTSCHENKOI* RONNIGER AT DIFFERENT GROWING ALTITUDES IN MAZANDARAN, IRAN

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ABSTRACT. *Thymus fedtschenkoi* Ronniger (Lamiaceae) is a permanent, that grows in some mountain rangelands of Iran, including Mazandaran province. The aerial parts of *Thymus fedtschenkoi* were collected during flowering stage in June 2012, from mountain rangelands of Mazandaran province, in north of Iran. Samples were collected from five altitudes (1300 m, 1600 m, 2000 m, 2400 m and 3000 m) in mountain region of Mazandaran province. The goal of current research was to assessment the effect of altitude on the chemical composition and function of essential oil in *Thymus fedtschenkoi*. The essential oil were obtained by hydrodistillation and analyzed by gas chromatography (GC) and gas spectrometry (GC-MS). Based on the results, the essential oil content is between 0.92-1.31%, at different altitudes. The highest content of essential oil (1.31%%) was extracted in the highest altitude (3000 m), while it was opposite (0.92%) in the lowest altitude (1300 m). The main essential oil compounds of *Thymus fedtschenkoi* samples were thymol (8.62%-36.86%), carvacrol (6.787%-68.39%), γ-terpinene (1.473T-6.461%), p-cymen (5.764%-16.204%) and linalool (0.465%-6.457 6.8%). According to the results, altitude has a positive effect on the percentage of essential oils and essential oil increases with increasing altitude. The altitude has a negative effect on the percentage of thymol and the content of thymol decreased with increasing altitude. The altitude has a positive effect on the percentage of carvacrol and the content of carvacrol increased with increasing altitude.

Keywords: carvacrol: thymol; mountain rangelands.

NOTE: RECORDING OF SOME BEETLES IN HONEY BEE COLONIES

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ABSTRACT. Honey bees are very valuable to human. These social insects contribute in the pollination of many crops. Also, the products from honey bee colonies have many nutritional and medicinal benefits. Thus, keeping honey bees are very valuable and can be considered as source of income to many families. There are many diseases and pests that attack honey bee colonies. The pests attack bee colonies include: hornets, wax moths, bee-eater birds, and beetles. Such challenges can impact the survival and productivity of honey bee colonies. In this study, some beetle species belong to Fam. Nitidulidae, Dermestidae and Mycetophagidae were detected in honey bee colonies in Egypt, during spring. Despite the presence of many beetle species in the agricultural environment, only few species preferred the invasion of the colonies for feeding. These beetles do not attack stages of honey bees. They only feed on stored pollen or bee bread, especially those fallen on the bottom of the beehives. This is an alarm to follow the feeding behavior and distribution of these beetles. These beetles' species can be considered as potential pests to weak honey bee colonies, housed in old or damaged beehives. The presence of large numbers of these beetles in weak colonies may disturb the activities of the bees and may passively impact the survival of the colonies. Listing these beetles is very important to better understanding the interaction between honey bees and beetles. On the other side, small hive beetles were not detected in the colonies. These beetles are currently one of the

major problems facing honey bees in different parts of the world. This study confirms the absence of small hive beetles from Egypt.

Keywords: Nitidulidae; Dermestidae; Mycetophagidae; debris.

CONTRIBUTIONS OF AGROFORESTRY ON SOCIO-ECONOMIC CONDITIONS OF FARMERS IN CENTRAL PUNJAB, PAKISTAN – A CASE STUDY

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ABSTRACT. Agroforerstry (AF) in the farmlands of Punjab (Pakistan) is a tradition, but it was practiced without any proper methodology. From last few years, AF practices have become popular in Punjab. Especially in the rural areas woody biomass is being used as a major source of energy. The study was designed to examine the contributions of AF on the socio-economic conditions of the farmers in the central Punjab of Pakistan. District Chiniot was selected as the universe of study and a detailed survey was conducted in the three tehsiles by interviewing 150 randomly selected farmers with the use of a well-structured questionnaire. In addition, secondary data was also collected from district agriculture offices. Chi-Square test was used for quantitative data analysis. Results showed that farmer's annual income and household status was improved after practicing AF. Reasonably less poor farmers have more income increase than the poor farmers due to an extra investment, but income generation helped poor farmers to maintain the minimal living standards. Farmers perceived the advantage of trees immensely and the large scale farmers taking this as a genuine source of income. In adoption of AF, attitude of the farmers was independent of family size and settlement period, but was dependent on the occupation and number of livestock holding. The study suggested that, in the present financial scenario of the poor farmers, planting of suitable tree species with multiple benefits is an escape way to come out of the vicious circle of poverty. Along with that agroforestry can play a vital role in increasing the vegetation cover in forest deficient countries. Extension services and awareness programs should be arranged in the areas where people have negative attitude about AF practices, because the cultivated fields are the best places to grow the tree with crops. Moreover, subsidies and income generating project should be launched to motivate people towards AF.

Keywords: afforestation; farmland; income status; attitude; extension services; Chiniot.