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Effect of Different Levels of Foliar Application of Potassium on Hysun-33 and Ausigold-4 Sunflower (*Helianthus annuus* L.) Cultivars under Salt Stress

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(received March 20, 2012; revised May 8, 2013; accepted May 27, 2013)

Abstract. A hydroponic study was conducted to see the growth response of two cultivars of sunflower (Hysun-33 and Ausigold-4) to K^+ nutrition under salt stress during the growing season 2011, at National Agriculture Research Centre, Islamabad, Pakistan. Nursery of *Helianthus annuus* was raised in sand and ten-day old seedlings per hole were transplanted in each pot having four holes per pot lid. Half strength Hoagland's nutrient solution was filled in each pot. After the establishment of seedlings, salt stress (6 dS/m) was developed artificially. The treatments were, control, 2 and 4 % K^+ as K_2SO_4 foliar applications. Salt present in the growing medium caused a significant (P<0.00l), reduction in fresh and dry weights of sunflower. Salt stress suppresses the K uptake from pot. Application of varying levels of K_2SO_4 improved the fresh and dry weights of sunflower under both control and saline conditions. However, the highest increase in fresh and dry weight of control and stressed plants was observed when 2% K was applied. Further increase in the level of K application did not improve fresh and dry weights of salt stress and unstressed plants. The growth medium salts reduced sunflower growth.

Keywords: *Helianthus annuus*; salinity; K foliar application; biomass

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Growth and Yield Response of Sunflower (*Helianthus annuus* L.) to Sulphur and Boron Application

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(received February 7, 2013; revised July 31, 2013; accepted September 27, 2013)

Abstract. An experiment was conducted to study the growth and yield response of sunflower to sulphur and boron application. Sulphur (control, 15, 30 kg/ha) and foliar sprays of 1% boron solution (control, spray at 4 week after emergence, 20 days after first spray, at 4 weeks after germination + 20 days after first spray) was applied in soil. The results showed significant increase of all growth and yield parameters by varying levels of sulphur and boron application. Application of 30 kg sulphur/ha enhanced stem diameter (1.99 cm), number of achene per head (765.75) and oil content (36.42%). In case of combined use of sulphur and boron application, maximum plant height (171 cm), head diameter (20.71 cm), 1000-achene weight (54.56 g), biological yield (16.49 t/ha) and achene yield (3.99 t/ha) was recorded by the application of 2 sprays of boron solution (1%) at 4 weeks after germination and reproductive stage.

Keywords: sunflower, sulphur, boron, growth, yield

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In vitro Antifungal Activities of Extracts of Fruits and other Morphological Parts of *Xanthium strumarium* Against the Plant Pathogen, *Rhizoctonia solani*

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(received January 16, 2013; revised May 22, 2013; accepted June 27, 2013)

Abstract. *In vitro* antifungal activity of different plant parts of *Xanthium strumarium* (Compositae) was investigated against *Rhizoctonia solani* to seek safe natural alternatives to the harmful synthetic fungicides. The most active plant parts of *X. strumarium* were seeds, extracted with *n*-hexane and the leaves, extracted with absolute ethanol. The two treatments resulted in growth inhibition diameters of 45 mm and 47 mm, respectively. The value of MIC lied between 350.0 and 175.0 µg of *Xanthium* oil/mL. Gas liquid chromatography of the seed oil of *X. strumarium* revealed the presence of the usual fatty acids, palmitoleic (7.6%), oleic (21.6%) and linoleic (70.4%). The oil was separated into free fatty acids fraction and unsaponifiable matter fraction. The unsaponifiable matter fraction was separated on TLC, out of six separated compounds, two were active against *R. solani.* The infrared spectra (FTIR) of these two purified compounds pointed to a long chain hydrocarbon back-bone for both, one of them possessing in addition, an alcoholic moiety.

Keywords: *Xanthium strumarium*, antifungal activity, *Rhizoctonia solani*, seed-oil, unsaponifiable matter fraction

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Effect of Plant Age on Cotton Leaf Curl Disease (CLCuD) in Relation to Environmental Conditions

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(received July 9, 2012; revised July 19, 2013; accepted August 20, 2013)

Abstract. The effect of cotton leaf curl disease (CLCuD) and weather variables were studied using same genotypes of cotton, planted at 15 days interval during 15th, 23rd standard weeks of 2010-2011. On an average basis, the 15th standard week planting showed, significantly, less disease incidence than all other sowing dates. The incidence increased as the sowing was delayed up to 23rd standard weeks. Among the sowing dates, regardless of genotypes, disease incidence differed, significantly. The CLCuD boost up during 25th to 29thstandard (2010) and 27th to 31st standard (2011) weeks of the year, regardless of sowing date and genotypes. Disease incidence was low during 2011 as compared to 2010. The disease increased sharply during 2010 and gradually during 2011. Average maximum (34.8~39.8 °C), minimum (27.7~28.9 °C) temperature and relative humidity (62~79%) favoured CLCuD progression.

Keywords: cotton leaf curl disease, cotton cultivars, relative humidity, temperature

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Enrichment of Soymeal Medium to Increase the Rapamycin Production by *Streptomyces hygroscopicus*

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(received April 11, 2013; revised October 29, 2013; accepted October 31, 2013)

Abstract. Research was carried out to study the improved and increased production of rapamycin by *Streptomyces hygroscopicus* with soymeal enriched media. Media containing soymeal produced rapamycin upto 82.89 mg/L. The medium was enriched with different additives that can interfere with biosynthesis process. L-tyrosine supplementations led to noticeable increase in the rapamycin production to 112 mg/L. However, the progress was achieved upon addition of the shikimic acid (precursor rapamycin moiety), where, it reached 160 mg/L. The greatest increase was recorded after addition of calcium superphosphate (CaP) and the production achieved 176 mg/L. Other substances like vitamins and trace elements had either no or negative effects on the biosynthesis of rapamycin. The study also showed the ability of low concentrations of calcium phosphate to replace the expensive large amount of shikimic acid.

Keywords: *Streptomyces hygroscopicus,* rapamycin, immunosuppressants, soymeal

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Stability of Microbial and Chemical Indicators of the Minced Beef Meat under Freezing and Refrigerated Temperature

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(received January 7, 2013; revised September 26, 2013; accepted October 14, 2013)

Abstract. The microbial spoilage and chemical changes in minced beef meat were monitored during storage at freezing and refrigerating temperatures. Total viable count of *Pseudomonas*, *Streptococcus* faecal count, faecal coliform and *Staphylococcus aureus* in minced beef meat collected from supermarkets at day 0 were 4.3, 3.2, 2.5, 2.2 and 3.9 $\log_{10}$ CFU/g, respectively. These counts increased after 5 days of storage at 4±1 °C to 7.3, 7.1, 3.8, 5.0 and 3.3 $\log_{10}$ CFU/g, respectively. These counts decreased after 6 months at -10±1 °C to 3.2, 2.6, 2.0, 1.2 and 1.0 $\log_{10}$ CFU/g, respectively. The results also indicated that the total viable count of *Pseudomonas*, *Streptococcus* faecal count, faecal coliform and *Staphylococcus aureus* were higher in small butcher shop as compared to supermarket at day 0. On day 0 the thiobarbituric acid reactive in minced beef meat samples collected from supermarket and small butcher shop were 0.89 and 1.15 mg malonaldehyde/kg, respectively. After 5 days of storage at 4 °C, the thiobarbituric acid reactive in minced meat beef collected from supermarket and small shop increased and reached upto 2.95 and 3.74 mg malonaldehyde/kg, respectively. It increased to 3.02 in minced beef from supermarket, and 3.85 mg from small shop after 6 months at -10±1 °C. Lightness, redness and yellowness of minced beef meat decreased, when meat was kept under cooling and freezing temperature, however, lightness, redness and yellowness of minced beef meat were higher in density in supermarket samples than those of meat obtained from small butcher shops.

Keywords: cooling, freezing temperature, minced beef meat, TBARS, colour

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Comparison of Antibacterial Activity of Crude Alkaloid and Saponin Extract from *Phyllanthus niruri*

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(received February 26, 2013; revised July 31, 2013; accepted August 5, 2013)

Abstract. The antibacterial activity of crude extract of saponin and alkaloid from *Phyllanthus niruri* was investigated and compared against some test bacteria. With the activity of saponins, *Bacillus subtilis*, *Salmonella typhi* and *Klebsiella pneumoniae* were resistant at concentrations of 0.01 mg/mL and 0.02 mg/mL, while, they were susceptible at 0.03 mg/mL, 0.4 mg/mL and 0.05 mg/mL concentrations. With the activity of saponin and alkaloid, *B. subtilis*, *K. pneumoniae* and *S. typhi* were resistant at 0.01 mg/mL concentration, while, *Staphylococcus aureus* was resistant to alkaloid at 0.01 mg/mL concentration but susceptible to saponin at the same concentration. *Escherichia coli, Pseudomonas aeruginosa* and *S. aureus* were more sensitive to saponin with diameter of zone of inhibition of 8.00 mm, 12.00 mm and 12.00 mm compared with 5.00 mm, 10.00 mm and 10.00 mm, respectively, as observed in alkaloid. The test organisms were susceptible to saponin at a concentration of 0.03 mg/mL. *S. aureus* was resistant to alkaloid; *B. subtilis*, *E. coli*, *K. pneumoniae*, *P. aeruginosa, S. typhi* and *S. aureus* were sensitive to both saponin and alkaloid. Combined, saponin and alkaloid showed more potency and may offer an alternative therapeutic agent against bacterial infections.

Keywords: antibacterial activity, alkaloid, *Phyllanthus niruri,* saponin

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Utilization of Poultry Excreta for High Density Production of *Daphnia carinata* (King 1853): Cost Effective and Environmental Friendly Technique

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(received October 2, 2012; revised July 8, 2013; accepted July 10, 2013)

Abstract. *Daphnia carinata* was cultured for 21 days using poultry excreta to fertilise the medium at the rate of 500 ppt and maximum density of 5633.32 ± 88 Ind./L was recorded on 11th day of culture in the tanks, where, the feed was administered with 25% dosage followed by 50% dosage (1894.44 ± 9.68 Ind./L) and 75% dosage (1103.55 ± 17.80 Ind./L) of the initial dosage (500 ppt). A 50% renewal of the medium thrice a week proved optimal for the population development. The water analysis showed that the temperature range of 28 ± 2 °C and pH of 6-7 was conducive for optimal growth of *D. carinata.*

Keywords. *Daphnia carinata,* chicken manure, live feed, fish farming, aquaculture

Pak. j. sci. ind. res. Ser. B: biol. sci. 2014 **57** (1) 51-53

Short Communication

Heat Processing and Cold Storage Effects on Vitamins B_1 and B_2 of Buffalo Milk

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(received May 28, 2012; revised May 2, 2013; accepted June 17, 2013)

Abstract. Heat processing and cold storage effects on vitamins B_1 and B_2 contents of whole and skimmed buffalo milk were investigated. Whole and skimmed buffalo milk was heated at various temperatures (90-140 °C) for different time periods (2-90 min). Losses in vitamins B_1 and B_2 occurred to various extents depending upon the temperature and time period of heating and the storage conditions. Maximum losses in vitamins B_1 and B_2 were found on heating milk at 110 °C for 90 min and 140 °C for 8 min. Maximum losses in vitamins B_1 and B_2 were found to be 32.5 and 29.9% at 110 °C and 37.5 and 32.6% at 140 °C for whole buffalo milk, 30.4 and 26.4% at 110 °C and 34.8 and 29.6% at 140 °C for skimmed buffalo milk, respectively. Similarly, after 15 days cold storage, maximum amount of vitamins B_1 and B_2 was lost from heated whole and skimmed buffalo milk. Losses in these two water soluble vitamins were comparatively higher in case of whole buffalo milk than skimmed buffalo milk after heat treatment. However, losses in vitamin B_1 were higher than vitamin B_2 contents in all samples.

Keywords: buffalo milk, vitamins B_1 and B_2, heat processing, cold storage

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Short Communication

Biochemical Composition of Koi (*Anabas testudineus*) Collected from Paddy Field of Mymensingh, Bangladesh

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Abstract. An experiment was undertaken to analyse proximate composition of Koi (*Anabas testudineus*), collected from a rice field from Mymensingh, Bangladesh. Fishes were grown as a second crop along with rice. Moisture, protein, lipid and ash percentage (%) were evaluated as 70.07±1.10, 16.97±0.82, 13.01±0.47, 0.95±12, respectively, in wet basis. When compared to previous reports, a lot of variation was observed in the case of lipid.

Keywords: proximate composition, *Anabas testudineus*, paddy field, lipid

Pak. j. sci. ind. res. Ser. B. biol. sci. 2014 **57** (1) 57-58

Short Communication

First Record of *Cyphonotus testaceus* (Pallas, 1781) (Coleoptera: Scarabaeidae: Melolonthinae: Melolonthini) from Pakistan

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(received July 11, 2013; revised August 24, 2013; accepted August 29, 2013)

Abstract. The melolonthine species *Cyphonotus testaceus* (Pallas, 1781) is for the first time recorded from Pakistan. Geographic distribution of this rarely collected species is summarized. Habitus photo of the male collected in Pakistan is presented.

Keywords: *Cyphonotus testaceus*, new record, melolonthini, palaearctic region, oriental region, Pakistan

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