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Sorption-Desorption Characteristics of Benzimidazole Based Fungicide Benomyl on Physicochemical Properties of Selected Pakistani Soils and their Minerals

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(received April 1, 2015; revised July 4, 2017; accepted July 10, 2017)

Abstract. A versatile cost-effective fungicide, Benomyl (Methyl{1(butylamino)carbonyl}-1H-benzimidazol-2-ylcarbamate) has been utilised to investigate its sorption behaviour on physicochemical properties of soils, via batch equilibrium method. Linear and Freundlich adsorption isotherms were evaluated in two tested soils having values of slope $n < 1$ resembling the c-type curve. The distribution co-efficient K_{ads} for adsorption was 2.93 and 14.35 mL/ μ g both soils indicating low adsorption of Benomyl overall with relatively greater degree of adsorption on hilly soil and silt loam and lesser adsorption on sandy soil. Multan soils have more sand content (52%) so it has less K_d value. Desorption studies revealed that the adsorbed fungicides were firmly retained by soil particles and their adsorption was almost irreversible. Furthermore, the results were statistically evaluated through regression analysis and univariate ANOVA, also probability graphs were plotted to ensure the accuracy of the experimental data. The XRD analysis depicted an increase in basal spacing of pesticide in both soils.

Keywords: benomyl, sorption, desorption, physicochemical properties, soil organic matter

Response of Wheat to Gypsum Application at Farmers Fields in Rainfed Pothwar

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Abstract. In present study, possibility of use and dose of gypsum was explored in various agro-ecologies of Pothwar region, Pakistan. Experiments were conducted at farmers' fields for three years i.e., 2002-2003 to 2004-2005 at three different districts *viz.* Chakwal, Attock, Jhelum and Rawalpindi. After first rainfall of monsoon in the end of June, deep ploughing was done in the field with mouldboard plough. After that, gypsum was applied @ 1.25, 2.5, 5.0 and 7.5 t/ha to experimental plots. Application of gypsum resulted in increase in grain yield of wheat during three years. Application of gypsum increased grain yield in all the districts. There was 11.9 to 34 percent increase in wheat yield with application of 2.5 t/ha of gypsum. At experimental plots, where grain yields were less than 3.1 t/ha after application of 2.5 t/ha of gypsum, increasing gypsum application beyond 2.5 t/ha increased the yield further. However, at sites, where grain yields were more than 3.4 t/ha with application of gypsum @ 2.5 t/ha, further increase in gypsum dose beyond 2.5 t/ha decreased the yields. On the basis of these experiments, 2.5 t/ha was found the appropriate dose of gypsum for rainfed wheat.

Keywords: gypsum, wheat, rainfed, rainfall, Pothwar

Impact of Different Shapes of Pitchers on Water Saving and Water Use Efficiency of Ridge-gourd in Semi Arid Region of Pakistan

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Abstract. Pitcher irrigation is an ancient irrigation system, used for cultivation of small areas where water is saline and not fit for surface irrigation. This research aims to investigate the effect on water use efficiency and water saving of ridge gourd by utilization of different shapes of pitchers. Ridge-gourd was planted under four different pitcher shapes including T₁ (conical), T₂ (spherical), T₃ (round) and T₄ (cylindrical) shapes at the experimental field of Sindh Agriculture University Tandojam, Pakistan. Overall sixteen clay pitchers having 1.7, 1.3, 1.3 and 1.08 m³ volume of water under T₁, T₂, T₃ and T₄ respectively were installed in the soil. The irrigation water having electrical conductivity (EC) 1.3 dS/m with pH of 7.8 was used to fill the pitchers. The highest soil EC of 3.32 dS/m at 0-20 cm depth of soil was found under T₄ followed by T₃, T₂ and T₁, respectively. Whereas T₄ showed minimum soil EC as 1.30 dS/m at the depth of 40-60 cm. However the pH effect of T₁ was slightly higher as 8.4 at the depth of 40-60 cm in comparison to T₂, T₃ and T₄, whereas the minimum pH of 8.0 was found at 20-40 cm under T₄. The maximum vine length of ridge gourd was 211cm under T₄ and the minimum length of vine was 139 cm under T₂. The highest water use efficiency 8.6 kg/m³ was obtained under T₄ whereas the highest water saving as 82% was recorded under T₄ followed by T₂, T₁ and T₃.

Keywords: Pitcher irrigation, Ridge gourd, water use efficiency, water saving, vine length

Development and Characterisation of Fig (*Ficus carica*) Leaves Tea with Special Reference to Hypoglycemic Effect

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(received December 2, 2016; revised July 26, 2017; accepted August 1, 2017)

Abstract. The leaves of *Ficus carica* (Fig) possess wide range of biological activities and are used to treat diabetes and its complications. The aim of the study was to evaluate the hyperglycemic and antioxidant effect of tea of *Ficus carica* leaves on normal and hyperglycemic rats. Effect of fig leaves tea was investigated on blood glucose level, daily food intake, daily water intake, body weight gain and its effect with insulin. Insulin was administered intravenously. Fig leaves tea was orally administered to four group of rats. Oral administration of fig leaves tea for 15 days exhibited a significant hypoglycemic effect in hyperglycemic rats at different times of a day. Highest hypoglycemic effect of tea was observed at 3 h which shows that leaves of *Ficus carica* possess significant short term hypoglycemic effect and not so significant long term hypoglycemic effect. When comparison was made between two insulin treatments (10U and 5U insulin) with 1mL *Ficus carica* tea, no significant difference was observed with these two doses, which means that when given in combination of fig leaves tea even 50% decrease of dose of insulin did not produce significant difference in blood glucose level.

Keywords: diabetes mellitus, fig leaves, hyperglycemia, herbal medicine

Optimisation of Production Condition of Alkaline Protease Using Indigenous *Bacillus subtilis* from Agricultural Soil

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(received August 6, 2015; revised May 20, 2016; accepted August 15, 2016)

Abstract. In this study, proteases have been isolated from agricultural soil samples and then cultured by shake flask method. The growth of the *Bacillus subtilis* has been confirmed by microbiological test on the agar plate and skim milk agar in rough, raised and irregular colonies. The yield of the alkaline protease has been optimised by varying the main factors i.e., nitrogen source (peptone, yeast extract, beef extract, casein, ammonium carbonate and urea), carbon source (sucrose, fructose, mannose, lactose, glucose, maltose and starch), incubation period (12, 24, 36, 48, 72, 84 and 96 h), temperature (35, 40, 45, 50, 55, and 60 °C) and salts (potassium sulphate, magnesium sulphate, calcium sulphate and manganese sulphate). The results revealed that the maximum enzyme production was obtained using casein and minimum activity was obtained using urea as a nitrogen source. Similarly, other factors have shown significant effect on the activity of the enzyme.

Keywords: proteases, agricultural soil, shake flask method, optimisation

Deforestation Drivers in Tehsil Barawal, Dir Upper, Pakistan

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(received January 14, 2016; revised February 22, 2017; accepted February 23, 2017)

Abstract. The study area Tehsil Barawal, district Dir (U) of forest has facing serious problems of deforestation. The forest of the study area is ever green forest trees like (*Cedras deodar*, *Abies pindrow*, *Pinus roxbergii*, *Picea smithiana* and *Pinus wallichiana*) are dominate trees. The focus of the study area was to explore the various drivers of the deforestation. The study was based on field survey and GIS and remote sensing techniques. The results of field survey revealed that there are seven drivers of deforestation, source of income from forest, fuel forest collection, illiteracy rate, agriculture expansion, forest fire, illegal cutting/harvesting and encroachment. The field survey shows that 40% people agreed that the major driver of deforestation in the area is agriculture. Study was based on the GIS and remote sensing techniques to explore the various drivers of the deforestation from year 2000 and 2012. In this study the images of 2000 and 2012 were downloaded from landsat 5 satellite. Five key classes such as forest, agriculture, barren land, snow and water were acknowledged. The result showed that the study area Tehsil Barawal, District Dir (U) of forest, barren land, agriculture, water and snow in year 2000 was 49.54, 43.38, 5.19, 1.40 and 0.49%, and the area in 2012 was 37.17, 41.36, 12.69, 5.05 and 3.72%, respectively. After data analysis it was cleared that 2.02% decrease in barren land, 12.37% decrease in forest and 7.5% increase in agriculture land was identified. Therefore, from field as well as from GIS and RS results it was cleared that agriculture is the key driver of the deforestation study area.

Keywords: sensing techniques, deforestation, harvesting, Upper Dir.

Population Density Estimates of Punjab Urial in Scrub Forest

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(received May 25, 2016; revised May 5, 2017; accepted May 16, 2017)

Abstract. A ground survey of the population of Punjab urial (*Ovis orientalis punjabiensis*) was conducted in 2007 on transect lines following the distance sampling methodology in five localities of district Jhelum, Punjab, Pakistan. Its aim was to determine the population status with reference to trophy sized males. The estimated population density for 5 distinct survey areas (Kandal Un-classed Forest and Jalapur Wildlife Sanctuary, Phadial Reserved Forest, Nili South and Brali Reserved Forests, Lehri and Jindi Reserved Forests and Tilla Jogian Game Reserve). Per square kilometer of area, respectively was 1.26 ± 0.49 , 1.30 ± 0.56 , 0.46 ± 0.19 , 0.36 ± 0.15 and 0.37 ± 0.13 , and overall for combined data it was 0.63 ± 0.14 . The male/female ratio indicated a preponderance of females over the males (1:2.53). The estimated mean group size was 5.08 ± 0.44 . The study showed some indications of recovery in the population of Punjab urial in a context of increased protection efforts by the Punjab Wildlife Department in the recent past by the introduction of community-based trophy hunting in the area as a conservation and management tool.

Keywords: Punjab urial, *Ovis vignei punjabiensis*, distance sampling, line transect, population density

Comparative Toxicity of Spinetoram and Nitenpyram against Earthworm and their Effects on Protein Contents and Cholinesterase Activity

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Abstract. The earthworms' numbers and biodiversities are considered as an indicator of soil nature and fertility. Earthworms are very important soil organisms that aid in the decomposition of plant litter. In recent era earthworm obtain more attention in agriculture practices, so that in the present work to determined the comparative effects of nitenpyram and spinetoram on total amount of protein and cholinesterase activity of *Pheretima posthuma* Kinberg (Order: Haplotaxida and Family: Megaseolecida) earthworm. Total protein contents were found to be decreased significantly in the peristomium, clitellum, and abdomen regions under treatments of nitenpyram and spinetoram. Cholinesterase activities were inhibited in the peristomium, clitellum and abdomen under the exposures of nitenpyram and spinetoram, at the intervals of 30, 60 and 90 seconds in *P. posthuma*. Conclusively it is safe to say that spinetoram is better than neonicotinoids for the earthworms, therefore could be switched from neonicotinoids as an IPM component.

Keywords: enzyme, bio-pesticide, neonicotinoid, earthworm

Short Communication

Correlation and Regression Coefficient Estimates between some Growth Performance Traits of Harnai Sheep

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Abstract. Present investigation was carried out to estimate the correlation and regression coefficient estimates between some growth performance traits of Harnai sheep. The available data was collected and maintained at Multipurpose Sheep Research Centre Yetabad, District Loralia, Balochistan, Pakistan. The data regarding growth traits including birth weight, yearling weight, weaning weight and fleeces weight was analysed for the estimation of correlation and regression coefficient. In present study the results for correlation and regression coefficient estimates were observed low to positive between some growth performance traits of Harnai sheep. Due to low results for correlation and regression coefficient, it is concluded that mass selection is advisable for achieving better performance in growth traits of Harnai sheep.

Keywords: correlation, regression coefficient, growth traits, Harnai sheep

Review

A Review on Rangeland Management in Pakistan, Bottlenecks and Recommendations

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(received August 25, 2016; revised March 30, 2017; accepted May 2, 2017)

Abstract. Role of rangelands in the livelihoods improvement of rural communes' is pivotal, through animal rearing, obtaining versatile products and services. Rangelands play key role in maintenance of agro-ecosystem and preservation of biodiversity in the country by improving infiltration rate, leading thereby a sustainable water flow in the down streams and reducing soil erosion. However, due to increased population pressure there is analogous increase in the demand for food, forage and other resources. In addition rangelands provide wildlife and fish habitat and recreation spots. Keeping in view the current global climate change scenario the government has given high priority to rangelands management, hence the concentration of the politicians and policy makers is to focus on the sustainable rangeland development and management. The article deals first with the importance of range management, then discusses rangelands problems of Pakistan, causes of degradation of rangelands, human factors contributing to range degradation and finally recommendations are discussed.

Keywords: Pakistan, rangeland, livestock, management, biodiversity

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