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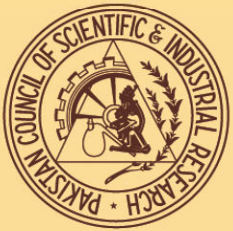

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Response of Potato Cultivars to Organic and Inorganic Fertilizers Under the Agroclimatic Conditions of Skardu (Gilgit-Baltistan)

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(received February 17, 2016; revised October 27, 2016; accepted October 31, 2016)

Abstract. Field research was conducted during summer season in 2010, in order to determine the effective combination between potato varieties i.e., the best yielding potato cultivar under organic or inorganic fertilizer in Skardu valley, Gilgit-Baltistan, Pakistan. A randomized complete block design (RCBD) was used for the trial and both the experimental factors (cultivar and fertilizer type) significantly affected the crops growth and yield variables. Among the nine different organic and inorganic fertilizer treatments, the maximum mean values of sprouting rate 43.1%, plant height 49.5 cm, number of tubers/plant (8.5), weight of tubers/plant (385.9 g), tuber diameter 3.8 cm and yield (25.7 t/ha) were obtained in the crops which received 10 tonnes FYM/ha + 150 kg N/ha. Among the cultivars tested, Desiree showed the maximum mean values of sprouting rate 30.4%, plant height 36.7 cm, number of tubers/plant 7.3, weight of tubers/plant 350.3 g, tuber diameter 3.7 cm and yield 23.4 t/ha. Overall results revealed that the treatment matched to 10 t/ha FYM + 150 kg/ha N (T7) led to the highest tuber yield and Desiree showed better performances than other cultivars.

Keywords: potato cultivars, fertilizer levels, yield, Skardu

Pak. j. sci. ind. res. Ser. B: biol. sci. 2017 **60**(3) 132-140

Mutagenic Effects on the Growth, Reproductive and Yield Parameters of *Praecitrullus fistulosus*

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Institute of Biotechnology and Genetic Engineering, University of Sindh, Jamshoro, Pakistan

(received June 2, 2016; revised December 11, 2016; accepted December 13, 2016)

Abstract. The aim of this study was to modify the growth, reproductive and yield parameters of *Praecitrullus fistulosus* by mutagenesis. The seeds of the plant were treated with chemical mutagens including ethidium bromide and colchicine in concentration of (0.05 and 0.10%) and (0.01 and 0.02%), respectively. Seeds were also treated with UV rays at periods of 1 and 2 h and X-rays for 75 KeV at periods of 5 and 10 sec. The growth features were observed at an interval of one week till the 11th week of their growth period. The data showed that seed germination value and lethality (%) of plants were 80 and 75%, respectively and highest in control plants. The time of seed germination (1.6 days) was least in plants treated with X-rays (10 sec). The mutation frequency (80%) was found to be highest in X-rays (10 sec) and colchicine 0.02%. The vegetative growth parameters such as stem length (77 cm), length of leaves (6.6 cm), average number of leaves (36) and leaf surface area (49.6 cm^2) was highest against ethidium bromide 0.01%, colchicine 0.02%, ethidium bromide 0.10% and UV rays 1 h, respectively. While the average diameter of stem of control plants was highest (49.6 cm^2). The minimum flowering time (31 days) and fruiting time (42.5 days) were observed in ethidium bromide 0.05% and colchicine 0.01% treated plants. The highest number of fruits (4) was observed in colchicine 0.01% treated plants. In conclusion, seeds of *P. fistulosus* treated with ethidium bromide and colchicine caused positive impact on growth, reproduction and yield attributes as compared to UV and X-rays treatments.

Keywords: mutagenic effects, physical mutagens, chemical mutagens, *Praecitrullus fistulosus*

Pak. j. sci. ind. res. Ser. B: biol. sci. 2017 **60**(3) 141-144

Effect of Physical, Chemical and Physiochemical Treatments of Surface Sterilisation on Medicinal Plants *Salvadora persica* and *Solanum surattense* for *In-vitro* Propagation

Beena Naqvi[a]*, Saleema Mehboob Ali[b], Kiran Makhani[b] and Kamran Yousuf[b]
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(received June 23, 2016; revised November 25, 2016; accepted December 15, 2016)

Abstract. Effect of various surface sterilisation treatments on medicinal plants *Salvadora persica* and *Solanum surattense* has been studied for *in-vitro* propagation. Surface sterilisation treatment was applied by physical, chemical and physiochemical means. Chemical sterilisation was done with sodium hypochlorite, physically with sonication and physiochemically with combination of both. Sodium hypochlorite alone was found to be effective for smooth textured plant i.e., *Salvadora persica*, whereas for rough textured plant *Solanum surattense* a combination of both physiochemical means yielded good results. However, sonication alone did not render the effective way of surface sterilisation. Moreover, for *Salvadora persica*, 10% sodium hypochlorite was effective in eliminating bacterial or fungal growth whereas in *Solanum surattense*, a concentration of 15% sodium hypochlorite proved to be effective. In general, best results were achieved in the combined treatment by physiochemical means.

Keywords: physiochemical treatment, surface sterilisation, *in-vitro* propagation

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Application of Spectroscopic Techniques for Antioxidant Property Analysis of Various Food Supplements and *Ganoderma lucidum* Coffee

Zeynep Aygun
Bitlis Eren University, Vocational School of Technical Sciences, Bitlis, Turkey

(received August 29, 2016; revised January 10, 2017; accepted February 10, 2017)

Abstract. In the present study, different methods were used to investigate the magnetic and structural properties of some food supplements and a kind of *Ganoderma lucidum* coffee. In order to understand the antioxidant capability of the samples and to detect paramagnetic centres, EPR (Electron Paramagnetic Resonance) experiment was carried out at room temperature. To examine the structural features and crystalline property of the samples, XRD (X-ray diffraction) method was used. SEM (Scanning Electron Microscopy) technique was preferred to analyse the surface morphology. Also, EDS (Energy Dispersive Spectroscopy) was performed to get information about the elemental composition of the samples. Antioxidant potential of these samples were examined in detail which is important to support our body functions.

Keywords: antioxidant property, coffee, food supplements, *Ganoderma lucidum*

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Biochemical Evaluation of *Trigonella foenum graecum* (Fenugreek) With Special Reference to Phenolic Acids

Imran Pasha, Muhammad Asim Shabbir, Muhammad Adnan Haider, Bahzad Afzal, Muhammad Farhan Jahangir Chughtai*, Shabbir Ahmad and Muhammad Sajid Manzoor
National Institute of Food Science & Technology, Faculty of Food, Nutrition & Home Sciences, University of Agriculture, Faisalabad, Pakistan

(received August 15, 2016; revised November 9, 2016; accepted December 28, 2016)

Abstract. In current study nutritional constituents of fenugreek seeds *Trigonella foenum graecum* and antioxidant potential was determined. Rheological aspects of fenugreek supplemented flour were evaluated. Total phenolic contents (TPC) were quantified by using spectrophotometer. TPC content was higher in ethanol extract as compared to methanol extract, accounted for 9.11mg GAE/g, and 7.82mg GAE/g, respectively. High pressure liquid chromatography was used to analyze the individual phenolic acids. Chlorogenic acid was found in higher quantity accounted for 167. 9 µg/g and sinapic acid with lowest amount 8.6 µg/g. Composite flours with treatments T_1, T_2, T_3 and T_4 of fenugreek seed powder with wheat flour were prepared and their rheological properties revealed the T_4 with best and healthy results. Physicochemical and sensory analysis of cookies depicted that T_1 was best as compared to rest of the treatments.

Keywords: fenugreek, physicochemical analysis, phenolic acids, antioxidant, rheology, cookies.

Pak. j. sci. ind. res. Ser. B: biol. sci. 2017 **60**(3) 162-167

Vehicular Traffic Air Pollution as Expressed by Leaves of *Senna occidentalis* (L.) Link from Three Busy Roads in Nigeria

Jonathan Eromosele Otoide* and Patrick Olugbenga Tedela
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(received September 3, 2016; revised January 6, 2017; accepted February 22, 2017)

Abstract. Matured leaves of *Senna occidentalis* (L.) were collected along the sides of busy roads of Oluku, Agbor and Sapele in Benin city, Nigeria where they were constantly exposed to air pollution from vehicular traffic (polluted populations). Others were collected from forest areas of Ebvomodu, Ebvoneka and Eyaen villages, each located within the distances of 50-60 km away from Benin city, where there was no source of vehicular air pollution(non-polluted populations). Peelings of the adaxial (upper) and the abaxial (lower) leaf epidermis were stained and microscopic examination and line drawings results showed that the leaves of the polluted populations suffered epidermal cell aberrations which ranged from plugged stomata, epidermal cell erosion and occasional leaf perforations caused by the corrosive activity of some of the pollutants as they undergo chemical reactions. These forms of damages were not observed in the non-polluted populations which were healthy with opened stomatal pores. At the upper (adaxial) epidermis, the mean lengths (µm) of stomatal pores of leaves of non-polluted populations of collections were 0.64 ± 0.41, 0.76 ± 0.84 and 0.74 ± 0.92, respectively and at the lower (abaxial) epidermis, the mean lengths were 0.61 ± 0.81, 1.40 ± 0.95 and 0.71 ± 0.81 from Ebvomodu, Ebvoneka and Eyaen, respectively. In the same vein, the mean width (µm) of pores of stomata of the non-polluted leaves collected from Ebvomodu, Ebvoneka and Eyaen were 1.14 ± 0.16, 0.32 ± 0.63 and 0.32 ± 0.11, respectively, at the upper (adaxial) epidermis. At the lower (abaxial) epidermis, the mean width (µm) of pores were 0.22 ± 0.25, 0.30 ± 0.51 and 0.39 ± 0.16 for collections from Ebvomodu, Ebvoneka and Eyaen, respectively. The stomatal pores of leaves of the polluted populations on the other hand were impossible to be measured because they were plugged by particulate air pollutants from the busy roads. It was opined that the leaves of the polluted populations would suffer eco-physiological stress by virtue of their plugged stomatal pores.

Keywords: *Senna occidentalis* (L.), vehicular traffic, air pollution, physiological stress, leaves

Pak. j. sci. ind. res. Ser. B: biol. sci. 2017 **60**(3) 168-175

Spider Diversity in Some Common Oilseed Crops in Central Punjab, Pakistan

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(received September 14, 2015; revised November 14, 2016; accepted December 13, 2016)

Abstract. Three commonly cultivated oilseed crops *viz*., soybean, sunflower and Indian mustard were sampled to compare density and diversity of spider at different developmental stages. This study was conducted at Ayub Agriculture Research Institute, Faisalabad, Pakistan. A total of 1210 spider individuals, 68 species and 5 families were sampled throughout the study period. The families showed different levels of association with the crops, like Lycosidae and Clubionidae were found commonly spread and highly abundant, whereas Philodromidae was only restricted to sunflower and locally rare. The *Evippa sohani*, *Pardosa fletcheri*, *Evippa shivajii* and *Pardosa oakleyi* were recorded most dominant and commonly spread spider species. Indian mustard constituted highest diversity of spider species followed by soybean and sunflower. Spider species diversity on the Indian mustard was significantly different from the sunflower. These predator species can play a major role to suppress devastating agricultural pests of oilseed crops, thereby enhance the crop yield.

Keywords: Araneae, agro-ecosystem, oil seed, ecology, agrochemicals, spider diversity

Pak. j. sci. ind. res. Ser. B: biol. sci. 2017 **60**(3) 176-182

Review

Role of Herbal Immunomodulators in Control of Coccidiosis Disease

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(received February 12, 2016; revised December 19, 2016; acceped December 28, 2016)

Abstract. Herbal plants and their derivatives have been utilized since antiquity in the control and management of poultry coccidiosis. The best known herbal plants in use against coccidiosis are corn, wheat bran, rice bran, polysaccharides, soya bean, barley, oat, extracts of grape seed, *Dictamnus dasycarpus* Turcz, *Pulsatilla koreana*, *Sinomenium acutum*, *Ulmus macrocarpa*, *Dichroafe brifuga* and other botanical antioxidants which contain many active compounds. These compounds have been found to possess antiprotozoal, anti-parasitic, anti-inflammatory and antioxidant properties. Currently demand and utilization of these aforesaid herbs has increased because these have been proved successful and effective in control of coccidiosis, eco-friendly and economical. The effective potential of these herbals and derivatives to have been reviewed overcome coccidiosis effectively in a better way than other synthetic products against which resistance has been developed.

Keywords: coccidiosis, immunomodulators, herbal plants, poultry

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