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RICE – RHIZOBIUM INTERACTIONS FOR BIOLOGICAL NITROGEN FIXATION: TECHNICAL CHALLENGES

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Abstract: Nitrogen is the most important nutrient input required for rice production. As most of the soil is deficient of N, N-fertilizers are needed. But, instead of chemical fertilisers, biological nitrogen fixation (BNF) is preferred. In that too, conventional BNF has limited capacity to render rice independent of external sources of N. Therefore, a major goal of BNF research has been to extend the nitrogen fixing capacity to rice. In this context, recent advances in understanding symbiotic *Rhizobium*-legume interactions at the molecular level, the discovery of natural endophytic interactions of rhizobacteria with rice, potentiality of rice nodulation, as well as potentiality of introduction / expression of *nif* genes in (to) rice has offered exciting opportunities to stretch rice research horizons, though there are technological challenges. These aspects have been reviewed in this article.

Keywords: Rice-*Rhizobium* interactions, Biological nitrogen fixation, Endophytic association, Nodulation in rice

EFFECT OF DIFFERENT THERMAL ENVIRONMENTS ON THE GROWTH AND DEVELOPMENT OF WHEAT VARIETIES FOR CHHATTISGARH PLAIN

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Abstract: The effect of different thermal environments on the growth and development of wheat varieties for Chhattisgarh Plain. Higher number of ear heads/m² observed with 05 December and 15 December sowing may be due to favorable temperature conditions during tillering stage i.e., maximum was below 28°C, minimum was below 12°C and mean temperature was below 20°C. Length of ear heads of different wheat varieties was influenced due to temperature and shifting thermal environment. Longer ear head (9.4 cm) was observed in first and second date of sowing (25 November and 05 December) as compared to delayed sowing of 15 December, 25 December and 05 January. Longer ear head was observed in variety GW-273 (9.4) while minimum (8.4) was observed in Amar. The maximum number of grains/ ear head was observed in D₁ (52) as compared to other sowing dates (D₂, D₃, D₄ and D₅). The test weight of different wheat varieties was influenced significant by different thermal environment and delayed sowing ultimately resulted in lower test weight. On an average the higher test weight (40.1) was observed in D₁ (25 November) at par with 05 December sowing as compared to late sown condition. Maximum grain yield 3307 kg/ha was harvested in 2nd (05 December) date of sowing which was significantly higher as compared to before and delayed sowing. On an average significant higher grain yield was obtained in variety Kanchan (3190 kg/ha) followed by GW-273 whereas, the lower grain yield was recorded in variety Amar (2609 kg/ha) and Sujata (2740 kg/ha) being at par to each other. Higher straw yield (4667 kg/ha) was observed in Kanchan under 2nd sowing date (05 December) whereas the lowest (2703 kg/ha) was observed in variety Amar under 05 January sowing. On an average, in different sowing dates significantly, highest straw yield (3964 kg/ha) was recorded in variety Kanchan as compared to other varieties.

Keyword: Grain yield, Straw yield, Thermal environments

COMMON INDIAN MEDICINAL PLANTS TRADITIONALLY USED FOR ANTICANCER ACTIVITY—A REVIEW

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Abstract: Cancer is an abnormal growth and proliferation of cells. It is the world second biggest killer after cardiovascular disease. Medicinal plants have been used for healing and preventative health for thousands of years all around the world. The use of herbal medicines in cancer prevention and treatment is increasing worldwide, now days because of their natural origin and lesser side effects. Traditional medicines are widely used in India. There are 21,000 plants which are used for medicinal purposes around the world as listed by World Health Organization. Among these, 2500 species are in India, out of which 150 species are used commercially on a large scale. India is called as botanical garden of the world and is the largest producer of medicinal herbs (Seth *et al.*, 2004) Research indicates several possible mechanisms of action for herbal medicines and their phytochemicals may act alone or in concert to reduce cancer risk through their anti-oxidant (Ahmed *et al.*, 2013), and anti-tumorigenic properties, as well as their direct suppressive effect on carcinogen bioactivities. In this article we gather the information about the easily available plants used previously and recently identified in the treatment of cancer.

Keywords: Ayurveda, Cancer, Medicinal plants, Treatment

EFFECT OF TEMPERATURE ON DIFFERENT VARIETY OF WHEAT UNDER LATE SOWN CONDITION FOR THE CHHATTISGARH PLAIN

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Abstract: The least effect of thermal stress was observed in case of GW-273 (13 days). The maximum, minimum as well as mean temperature increased gradually when the sowing was delayed from 25 November to 05 January, CRI to 50% flowering and 50% flowering to maturity. At 50% flowering to maturity the maximum, minimum and mean temperature was observed as high as 40.5, 22.3 and 31.4°C for variety Amar when sown on 05 January. This showed that 34-35°C maximum, 17-18°C minimum and 26-27°C mean temperature were more favorable for higher yield of wheat crop under Raipur condition. It was observed that plant height decreased when the sowing was delayed from 25 November to 05 January. The highest dry matter was observed at maturity for Kanchan (809.8 g/m²) while lowest dry matter was observed in varieties Amar (476.5 g/m²). The dry matter growth rate varied differently for different varieties under different thermal environments. Temperature pattern revealed that the maximum and mean temperature was lower when the crop was sown on 25 December while the minimum temperature was lower on 05 January sowing as compared to other sowing dates from sowing to 30 days after sowing. Among the four varieties, GW-273 was found to be moderately susceptible while other varieties are susceptible for thermal stress; this might be probable reason for reduction total duration and stunted crop growth.

Keyword: Temperature effect, Thermal stress, wheat yield

EVALUATION OF DIFFERENT CUCUMBER STRAIN FOR VARIOUS HORTICULTURAL TRAITS UNDER VALLEY CONDITION OF GARHWAL HIMALAYA

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Abstract: The present research was undertaken with 14 different strains of cucumber for evaluating their ability for various quantitative and qualitative horticultural traits under Garhwal Himalaya Region. The analysis of variance revealed highly significant for all the characters studied. The K-90 recorded highest vine length (310.59 cm), number and T.S.S (6.84 °Brix). Whereas HP-2 recorded minimum days taken to opening of 1st female flower (43.21) maximum % of fruit setting (93.40), number of fruits/vine (20.00), and carbohydrate (3.39). SPP-63 showed minimum number of nodes bearing first male flower (4.25) and days taken to opening of 1st male flower (40.23). The strain New Manipur-1 recorded maximum number of primary branches/plant (12.23), minimum sex ratio (10:1), average fruit weight (205.05 g), fruit diameter (6.59), fruit yield/vine (3.61 kg), fruit yield/plot (44.46 kg), fruit yield/ha. (49.42 t/ha.), vitamin C (7.63 mg/100g) and minimum number of nodes bearing first female flower (6.11) and Maximum strains used in this research work are superior in different characters, which could be use for the improvement programmes.

Keywords: Cucumber, Quantitative, Qualitative, Sex, Fruit, Yield

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IMPACT OF ABIOTIC FACTORS ON THE DISEASE DEVELOPMENT OF ALTERNARIA BLIGHT OF CORIANDER CAUSING *ALTERNARIA POONENSIS* RAGUNATH

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Abstract: An investigation on Coriander susceptible cultivar Raunak-31 suffered from Alternaria blight caused by *Alternaria poonensis* Raghunath was conducted during Rabi October 2012 to February 2013. Five isolates were recovered from samples collected from Kota (1), Udaipur (3) and Baran (1). Of the three isolates of *A. poonensis* (Ap-01, Ap-02 and Ap-03) evaluated for pathogenic variability on pot -grown plants of susceptible cultivar Raunak-31, the maximum disease (53.2% PDI) was by isolate Ap-01 and minimum (32.4%) by Ap-03, suggesting that considerable variability exists in *A. poonensis*. Disease progress was influenced by different weather factors viz., temperature, relative humidity, sunshine and evaporation. The maximum AUDPC value (area under disease progressive curve) was 322 on plants inoculated on 21st November and the lowest (171.8) was on than inoculated on 20th December in 21- 27 February, standard week followed by maximum AUDPC value 273.7 and minimum 91.0 in 14- 20 February, standard week.

Keywords: Epidemiology, Abiotic, Raunak-31, Temperature, RH, Rainfall, *Alternaria poonensis*

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QUANTITATIVE ESTIMATION OF SEED PROTEIN AND ESSENTIAL OIL CONTENT IN EIGHT PLANT TYPES OF FENNEL (*FOENICULUM VULGARE* MILL.)

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Abstract: Investigation highlights quantitative estimation of seed protein and essential oil contents (from M₃ harvested seeds) in seven macromutants (screened at M₂), along with control. Results indicate that in comparison to control protein content enhance in *early flowering* mutant; while, essential oil content is higher in *thick stem*, *slender stem*, *pigmented stem* and *elongated pinnae* mutants. It opens up the scope of efficient breeding for raising desirable 'plant types' of interest.

Keywords: Fennel, Macromutants, Estimation, Seed, Protein

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EFFECT OF TEMPERATURE, PH AND VARIOUS MEDIA ON GROWTH AND SPORULATION OF *TRICHODERMA* SPP. ISOLATES FROM UTTAR PRADESH

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Abstract: *Trichoderma* spp. isolates were collected from different chickpea fields of Sultanpur, Sitapur, Barabanki, Kanpur Nagar and Etawah (Uttar Pradesh). These isolates were tested to study growth and sporulation behavior of *Trichoderma* sp. at different Temperature, pH and media. The most favorable temperature for growth and sporulation of *Trichoderma* sp. was found 30°C (74.33mg), followed by 25°C where average growth of the bio-agent was recorded as 64.66mg. Similarly the most favorable pH ranges was found 6.5 - 7.5 in which total dry weight of mycelium also varies between 200.33 to 226.33 mg and also very good sporulation was observed. The minimum dry weight was recorded as 109.66 at pH 3.0. Among the different media (*viz.*, Potato dextrose Agar, Rose Bengal Agar, Asthana and Hawker's Agar, Sabouraud's Agar and Czapek's (Dox) Agar) Potato Dextrose Agar (PDA) shows excellent in average colony diameter (8.09 cm) followed by Rose Bengal Agar (7.69 cm), but excellent average mycelium weight (176.66 mg) was recorded in Potato Dextrose Broth (PDB) medium and also excellent sporulation were observed on Potato Dextrose and Rose Bengal broth. Studies on the biology of *Trichoderma* sp. isolates at different temperature and pH conditions is helpful for practical utility to contain disease problems in agro-ecosystems.

Keywords: Effect, Temperature, Trichoderma, Uttar Pradesh

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EFFICACY OF MEDICINAL PLANT LEAF EXTRACTS, OILS AND BIOAGENTS AGAINST *RHIZOCTONIA SOLANI* CAUSING AERIAL BLIGHT OF SOYBEAN

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Abstract: Soybean (*Glycine max* (L.) Merrill) is one of the most important oil seed crop of India. It was wonder of the twentieth century. Soybean ranks first among world oilseed with an annual production of about 105 mt. In Chhattisgarh, the crop is grown over an area of 0.82 m ha with production and productivity of 0.73 mt and 891 kg/ha, respectively which are

much lower than national average. Soybean aerial blight caused by *Rhizoctonia solani* is a most important oilseed disease. The disease appears during July-August and is characterized by sudden and complete death of the plants. This disease is very destructive and causes heavy losses to the tune of 35-60 % in warm and humid parts of the countries. Antifungal activity of different medicinal plant leaf extracts, oils and *Trichoderma spp* were studied under *in vitro* condition. Out of fifteen medicinal plants studied, the leaf extracts of Butch significantly inhibited the mycelial growth of *Rhizoctonia solani* under *in vitro* conditions. Among the medicinal oils, Eucalyptus and Neem oils were found to significantly inhibit the mycelial growth of *Rhizoctonia solani* at 5% concentrations. Among the antagonists, maximum mycelial growth inhibition was caused by *Trichoderma harzianum* (74.81%) followed by *Trichoderma viride* (67.40%) while *Trichoderma spp.* (mushroom isolates) was least effective against *Rhizoctonia solani*.

Keywords: Soybean, *Rhizoctonia solani*, Antifungal compound, *Trichoderma spp.*

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ACID-RAINS ITS CAUSES AND IMPACTS ON CROPS IN NCR REGION

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Abstract: Most recently (2014-2015) the author has gone through vigorous survey of the literature and observed a very challenging natural climatic havoc, hazards to disturb the environment which may cause discomfort to whole of the humanity through out the world. The investigator who recently studied the composition of rainwater from 5 selected locations, the result is worried that it is pouring 'acid rain', caused by vehicular, industrial pollution and frenetic urbanisation. "In Pune and Nagpur, the amount of acid in rainwater has gone up five times since 1995," said V.K. Soni¹, a senior meteorologist with the Indian Meteorological Department (IMD) who conducted the study with colleague Jayant Sarkar, Former director of the IMD's air pollution unit. The researchers also collaborated with the World Meteorological Organisation.

Keywords: Acid rains, Crops, NCR region