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Contents

RESEARCH ARTICLES

SHORT COMMUNICATION

Journal of Plant Development Sciences Vol. 11(7)

PHYSIOLOGICAL RESPONSE OF IRANIAN WHEAT LANDRACES UNDER IRRIGATED, RESTRICTED IRRIGATED AND RAINFED CONDITIONS

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Abstrac: Drought is major abiotic stress thatinduce alterations in wheat physiology. The aim of present study was to investigate the effect of water stress on canopy temperature and chlorophyll content of 27 Iranian landraces along with commercial relevant checks under irrigated, Restricted irrigated and Rain-fed condition.Lines were selected on the basis of minimum reduction of vigor index under water stress induced by Polyethylene glycol (6000) as compared to control lines. A field experiment was carried out at experimental area of Department of Plant Breeding & Genetics, Punjab Agricultural University Ludhiana, Punjab during 2016-17 with three replications. Canopy temperature was recorded first at anthesis stage and then 10 days after anthesis. Chlorophyll content was recorded at regular interval from tagged plant from anthesis to maturity.IWA 8600179, IWA 8600064 and IWA 8600542 had lower canopy temperature whereas PETTERSONML68-10, IWA 8600596, IWA 8600064 and IWA 8600179 had maximum chlorophyll content under water stress.

Keywords: Anthesis, Chlorophyll content, Canopy temperature, Water stress

Journal of Plant Development Sciences Vol. 11(7)

AN IMPROVED AND EFFICIENT ORGANOGENIC REGENERATION PROTOCOL USING EPICOTYL SEGMENT OF *IN VITRO* GROWN KAGZILIME (*CITRUS AURANTIFOLIA*) SEEDLING

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Abstract: In the present study, an improved and efficient plant regeneration protocol of Kagzilime (*Citrus aurantifolia*) using epicotyl segment of *in vitro* grown seedlings was developed. Kagzilime seed sterilized with Bavistin @ 0.1% for 30 min followed by Mercuric chloride @ 0.1% for 15 min was found to be optimum to reduce the contamination and efficient seed germination. About 0.75-1.0 cm long epicotyl segments of *in vitro* grown 21 days old seedlings were found suitable explants for efficient plant regeneration. The best regeneration efficiency of 84% with 5 shoots/explant was obtained at BAP @ 2.0 mg/l. The higher efficiency of root induction of 60.60% with 4.40 roots/shoot was observed at lower concentration of NAA@ 0.5 mg/l. Over 90% of plantlets were acclimatized and grown at pot mixture of soil, sand and vermiculite @ 1:2:1 in greenhouse. The efficient regeneration protocol developed in this study will be useful for mass propagation of root stock, biological indexing of virus diseases, production of disease free elite planting material, plant transformation and *in vivo* expression of desired viral gene.

Keywords: Age of explants, Epicotyl segment, Kagzilime, Multiple shoots, Regeneration

Journal of Plant Development Sciences Vol. 11(7)

EFFECT OF SOAKING TREATMENT ON ENGINEERING PROPERTIES OF DIFFERENT RICE CULTIVAR

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Abstract: Some engineering properties of rice seeds were evaluated as the function of soaking treatment i.e. dry, one day soaked and two day soaked with four different rice cultivars i.e. Rajeshwari, Swarna, Mahamaya and MTU-1010. The study showed that the engineering properties such as geometric mean diameter, thousand seed weight, bulk density and angle of repose increased as the number of soaking days increased and the values considering all the cultivar and soaking treatments were falls in the range of 3.30 to 4.11, 19.46 to 38.01 g, 571.9 to 635.08 kg m^{-3} and 21.48 to 32.40 degree respectively. The values for Sphericity and true density were found to be in the range of 0.38 to 0.45 and 1102.66 to 1264.30 kg m^{-3} respectively. Also study showed that the values of geometric mean diameter, thousand seed weight, bulk density and angle of repose varied significantly at 5 per cent level of significance for different rice cultivar.

Keywords: Rice, Engineering properties, Soaking, Rajeshwari, Mahamaya, Swarna

Journal of Plant Development Sciences Vol. 11(7)

CHROMOSOME MORPHOLOGY AND BEHAVIOUR IN *ALOE VERA* L. PLANTS GROWING AT JAMMU, J&K STATE, INDIA

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Abstract: *Aloe vera* L., a medicinal plant belonging to family Asphodelaceae, has a long ethnobotanical and medical history. Though a prolific flower producer, seed formation occurs rarely in this species. Propagation occurs mainly through suckers. In order to probe the reasons behind the seedlessness, we investigated the meiotic system of the plants growing as escapes in our area i.e. Jammu, J&K state, India. Cytological characteristics of both sporophytic as well as gametophytic cells of these plants were investigated by studying pollen mitosis, nucellar cell mitosis and pollen mother cell meiosis. The species showed bimodal karyotype with karyotype formula as 6sm+8st in nucelllar cells and 3sm+4st in pollen grains. No significant difference was noted between chromosomes characteristics of haploid and diploid cells. The chromosome number of *Aloe vera* was 2n=14 (in nucellus cells) and n=7 (in pollen). While chromosome pairing was normal at metaphase I where 7II were observed, a large number of meiotic abnormalities was observed (69%) in the form of laggards, bridges and chromosome stickiness etc. during later stages. This reduced the pollen viability. Interestingly reduction in pollen viability had a correlation with environment factors in particular temperature. It showed a range from 2.45% to 79.47%. All the viable pollen were however cytologically stable with an expected haploid chromosome number as n=7 and karyotype formula as 3sm+4st.

Keywords: Karyotype, Gametophytic cell, Sporophytic cell, Bimodal, Meiotic system

Journal of Plant Development Sciences Vol. 11(7)

WEED DYNAMICS AND PRODUCTIVITY OF MAIZE (*ZEA MAYS* L.) UNDER PRE AND POST EMERGENCE APPLICATION OF HERBICIDE

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Abstract: A field experiment was carried out at Ambikapur, during the *kharif* season of 2017-18 to work out effect of new herbicide molecule along with combinations of already tested herbicides in sequential application for weed management in

maize. The field experiment was laid out in randomized block design with 11 weed management practices (alone and in combinations of atrazine, pendimethalin, halosulfuron, tembotrione, 2, 4-D, hand weeding and mechanical weeding) and replicated thrice. Pendemathalin (1000 ml ha^{-1}) PE fb Atrazine (750 g ha^{-1}) + 2,4-D Amine 0.4 kg ha^{-1} at 25 DAS as PoE provided significant weed management during the critical period of crop-weed competition. The treatment also recorded the lowest total weed density and dry weight with higher weed control efficiency at 50th day of crop growth and contributed highest yield attributes *viz.*, cob length, cob girth, number of kernel rows cob^{-1}, number of kernels row^{-1}, 100 seed weight and kernel yield (5.98 t ha^{-1}) which was found statistically at par with Atrazine 1.5 kgha PE fb Tembotrione 120 g ha PoE at 25 DAS (5.82 t ha^{-1}) and mechanical weeding 20 and 45 DAS(5.53 t ha^{-1}). Although hand weeding twice at 15 and 40 DAS is the most effective treatment as compare to herbicidal treatments. Highest net returns (Rs. 50297.65 ha^{-1}) and B: C ratio (1.57) was recorded under by Atrazine 1.5 kgha PE fb Tembotrione 120 g ha PoE at 25 DAS which was found statistically at par with pendimethalin (1000 ml ha^{-1}) PE fb Atrazine (750 gm ha^{-1}) + 2,4-D Amine 0.4 kg ha^{-1} at 25 DAS as PoE in terms of net return (Rs. 50064.04 ha^{-1}) and B: C ratio (1.47).

Keywords: Maize, Weed management, Sequential application of herbicide

Journal of Plant Development Sciences Vol. 11(7)

EFFECT OF BIOFERTILIZER, MANURES AND CHEMICAL FERTILIZERS ON GROWTH AND YIELD OF GUAVA (*PSIDIUM GUAJAVA* L.) CV. ALLAHABAD SAFEDA

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Abstract: The research experiment was carried out on "Effect of biofertilizer, manures and chemical fertilizer on growth and yield of guava (*Psidium guajava* L.) cv. Allahabad Safeda" at Horticultural Research Farm, Department of Horticulture, B. A. College of Agriculture, Anand Agricultural University, Anand during the year 2018. The experiment was laid out in Completely Randomized Designwith 09 treatments. The soil of the experimental site was loamy sand. The soil application of full dose of biofertilizer manures and chemical fertilizers were given as basal dose in last week of June and remaining half dose of chemical fertilizer given in first week of September.Among all the treatments, the soil application of 30 % RDF through chemical fertilizers + 30 % RDN through Poultry manure + 20 ml Bio NPK Consortium per tree treatment was most effective treatment and which was recorded significantly maximum incremental plant spread [N-S] (92.10 cm), incremental plant spread [E-W] (85.11 cm) and C grade fruit yield (4.92 Kg/tree). Whereas, the soil application of40 % RDF through chemical fertilizers + 40 % RDN through Poultry manure + 10 ml Bio NPK Consortium per tree treatment was recorded significantly maximum fruit weight (217.22 g), fruit volume (197.40 cc), total number of fruits per tree (171.33), A grade fruit yield (20.86 Kg/tree), B grade fruit yield (18.84 Kg/tree), total fruit yield (43.72 Kg/tree) and total fruit yield (12.11 tones/ha)

Keywords: Biofertilizer, Growth, Guava, Poultry manure, Yield

Journal of Plant Development Sciences Vol. 11(7)

EVALUATION OF SOME ADVANCE AND ELITE LINES OF WHEAT TO *BLUMERIA GRAMINISF*. SP. *TRITICI* IN NORTH WEST PLAIN ZONE OF INDIA

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Abstract: Wheat (*Triticum aestivum*) powdery mildew, caused by the biotrophic fungus *Blumeria graminis* f. sp. *tritici*, is one of the most severe foliar diseases attacking this crop, reducing grain yields by 10% to 62% in India. The disease can be controlled by genetic resistance of the host, but the pathogen has physiological specialization, which enables it to infect wheat cultivars that have

remained resistant for years. The objective of this work was to evaluate the variability of pathogenic strains of *B. graminis* f. sp. *Tritici* collected in northen part of India and the effectiveness of wheat resistant varieties/ lines to powdery mildew in the 2012-13 and 2013-14 crop season. It is an important disease of wheat (*Triticum aestivum* L.) in the plains north eastern region of Haryana and adjoining areas of states of Punjab and Himachal Pradesh. Studies was carried out at IIWBR, Karnal and Regional Research Station, Dhaula kuan duing *rabi* 2012-13 and 2013-14. Out of 203 entries evaluated, 67 were found tolerant and 37 were found resistant at both the location. Among all lines/varieties 27 were found susceptible and only seven were found highly susceptible at Karnal and 36 were found highly susceptible, whereas 43 were susceptible at Dhaula kuan, H.P. The resistant genotypes evaluated in the study can be utilized by the breeder while conducting the breeding programme.

Keywords: *Foliar diseases, Fungus, Variety, Wheat*

Journal of Plant Development Sciences Vol. 11(7)

PATHOGENICITY OF *PYRICULARIA ORYZAE* ISOLATES FROM DIFFERENT AGRO-CLIMATIC ZONES OF CHHATTISGARH

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Abstract: The fungus *Pyricularia oryzae* Cavara is the causal agent of rice blast disease. Yield reduction of 10-20% in susceptible rice varieties but in severe cases the yield loss caused by *P. oryzae* may reach upto 80-100%. The highly significant differences were observed among the 63 blast isolates in pathogenicity test. The highest PDI 96.30 per cent was recorded in four isolates and the lowest PDI 51.85 per cent were found in sixteen isolates.

Keywords: Rice blast, *P. oryzae,* PDI, Pathogenicity

Journal of Plant Development Sciences Vol. 11(7)

ASSESSMENT OF DIRECT AND INDIRECT RELATIONSHIPS AMONG FRUIT YIELD AND YIELD COMPONENTS IN OKRA (*ABELMOSCHUS ESCULENTUS* L. MOENCH)

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Abstract: Path analysis was studied using 31 diverse okra genotypes along with two checks *i.e,* Pusa Sawani and Pusa A-4. The experiment was laid out in Randomized Complete Block Design (RCBD) and observations were recorded on thirteen quantitative morphological traits on yield per plant in okra during Rainy season, 2017-2018. Among the characters studied, days to 50% flowering, number of fruits per plant and average fruit weight has direct positive effect on fruit yield per plant at both phenotypic as well as genotypic level. At phenotypic level, number of fruits per plant (0.792) exhibited maximum positive direct effect on fruit yield per plant followed by average weight of fruit (0.375), days to 50% flowering (0.275) and number of nodes (0.173). Whereas, at genotypic level number of fruits per plant (0.678) followed by number of primary branches (0.259), days to 50% flowering (0.102) and plant height (0.013) exhibited maximum positive direct effect on fruit yield per plant. However, the negative direct effect was found for percent disease incidence of YVMV at both phenotypic and genotypic levels. Some characters like Plant height, number of nodes and number of fruits per plant showed positive indirect effect on fruit yield per plant via days to first flowering at phenotypic level, whereas, at genotypic level plant height, number of primary branches, number of nodes and fruit length showed positive indirect effect on fruit yield via number of fruits per plant.

Keywords: Okra, Path analysis, Phenotypic level, Genotypic level, Yield

Journal of Plant Development Sciences Vol. 11(7)

FORAGING BEHAVIOUR OF STINGLESS BEE, *TETRAGONULA IRIDIPENNIS* (HYMENOPTERA –APIDAE) IN BROCCOLI FLOWERS IN AMBIKAPUR OF CHHATTISGARH

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Abstract: The observation was undertaken at Rajmohini Devi College of Agriculture and Research Station, Ambikapur of Indira Gandhi Krishi Vishavidyalaya Raipur (C.G.) during 2018-19 to study the foraging activity of stingless bee on broccoli flowers at five spots, five minutes per square meter at different hours of the day from 8AM to 5PM. The foraging activity was recorded highest in between 10-11AM (7.82 bee/5min/m^2/day) followed by in between 11-12 (4.91 bee/5min/m^2/day) noon and between 9-10 AM (4.00 bee/5min/m^2/day) and decreased in between 1-2PM (1.88 bee/5min/m^2/day), 2-3 PM (1.42 bee/5min/m^2/day) and increased between 3-4 PM(2.22 bee/5min/m^2/day). However, the lowest activity was recorded in between 4-5 PM (1.00 bee/5min/m^2/day).

Keywords: Broccoli flower, Foraging behavior, Stingless bee, *Tetragonula iridipennis*