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Contents

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INDUSTRIAL AND BIOTECHNOLOGICAL POTENTIAL OF MICROBIAL CELLULASES

Lebin Thomas, Hari Ram, Alok Kumar and Ved Pal Singh
Applied Microbiology and Biotechnology Laboratory
Department of Botany, University of Delhi, Delhi-110 007, India
Corresponding author's e-mail: vpsingh_biology@rediffmail.com

Abstract: Biodegradation of plant cellulose is achieved through a concerted action of a group of enzymes of the cellulase system, synthesized by a diverse range of organisms. This biodegradation holds importance not only in the efficient recycling of cellulosic biomass within the biosphere, but also in a vast variety of industrial and biotechnological applications. In industrial and research arena, there is an increased interest in utilizing cellulases for lignocellulosic biomass conversion for the production of biobased products and bioenergy. This article presents an overview of cellulase producing microorganisms, along with the important applications of cellulases in the bioconversion of lignocellulosic biomass and in several industries like food, animal feed, brewery, wine, textile, laundry, paper and pulp.
Keywords: Cellulase system, Cellulosome, Industrial applications, Lignocellulose bioconversion

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EXOTIC INVASIVE *AGERATUM CONYZOIDES* L. IN INDIAN DRY TROPICS: A PRELIMINARY INVESTIGATION OF ITS BIOMASS ALLOCATION PATTERN AND PLANT TRAITS

Nidhi Chaudhary and Rup Narayan
Department of Botany, I. P. (PG) College, Bulandshahr- 203001, Uttar Pradesh
E-mail-nidhi.c06@gmail.com

Abstract: Billy goat weed *Ageratum conyzoides* was investigated for its biomass allocation pattern and plant traits across two contrasting soil resource regimes in a peri-urban region in Indian dry tropics. The plant populations at low resource (LR) site showed higher root length, biomass of root, leaf and reproductive parts and their mass fractions. High resource (HR) site showed higher shoot length and stem mass fraction. Plasticity indices of root mass fraction, root:shoot length and biomass ratios were higher at LR site. Phenotypic plasticity was also higher here. Biomass allocation to different components varied

with ontogeny and soil resource states. Higher reproductive and root allocation by *Ageratum conyzoides* at LR site can be attributed to its successful invasive character in this region.
Keywords: Biomass allocation, Plant component biomass, Phenotypic plasticity, Bulandshahr

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SOIL MICROBIAL BIOMASS CARBON (µgCg^{-1} DRY SOIL) AT DIFFERENT GROWTH STAGES OF PADDY AS INFLUENCED BY LONG TERM APPLICATION OF FERTILIZERS AND MANURE UNDER CHHATTISGARH CONDITION

Rakesh Kumar Bhagat[1], D.K. Dewangan[1], G.K. Jatav[1,2*], V.A. Nayak[1] and R.N.Singh[1]
[1]Indira Gandhi Krishi Vishwavidyalaya, Raipur-492012, Chhattisgarh, India.
[2] Institute of Agricultural Sciences, B.H.U. Varanasi-221005
**Email:gouravjatav143@gmail.com*

Abstract: A field study was carried out during *Kharif* season of 2010-11 at the Research and Instructional Farm of Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur (C.G.). Experiment was conducted to examine the "soil microbial biomass carbon (µGCG^{-1} dry soil) at different growth stages of paddy as influenced by long term application of fertilizers and manure under Chhattisgarh condition". Soil microbial biomass carbon at different growth stages of paddy were determined from surface (0-15 cm) soil samples. The soil microbial biomass carbon at different growth stages was determined in paddy crop and fertilizer application significantly influenced soil microbial biomass carbon where the highest soil microbial biomass carbon was recorded under T_4 (100% NPK +FYM) followed by T_5 (50% NPK +GM), T_2 (100% NPK) treatment.T_1(Control) recorded the lowest soil microbial biomass carbon. The grain yield of rice was observed to be significantly influenced due to different treatments. The highest was recorded with T_4 (100%NPK +FYM), and was found significantly superior over rest of the treatments. The lowest grain yield was noticed under control plot.
Keywords: microbial biomass, paddy, grain yield, FYM

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Rakesh Kumar Bhagat[1], D.K. Dewangan[1], G.K. Jatav[1,2*], V.A. Nayak[1] and R.N.Singh[1]
[1]Indira Gandhi Krishi Vishwavidyalaya, Raipur-492012, Chhattisgarh, India.
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Keywords: microbial biomass, paddy, grain yield, FYM

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INCREASING CHICKPEA PRODUCTIVITY BY FOLIAR APPLICATION OF UREA UNDER RAINFED AND IRRIGATED CONDITIONS

Juli Nirwal* S.P. Singh* and J.D.S Panwar**
**Deptt. of Botany, Janta Vedic (P.G.) College, Baraut, Baghpat (U.P.)*
*** Division of Plant Physiology, Indian Agricultural Research Institute, New Delhi - 110012*

Abstract: To study the effect of foliar application of urea at different stages on growth and yield of four chickpea (C 235, Pusa 362, Pusa 1088 and Pusa 1053) genotypes under rainfed and irrigated conditions. Irrigated crop recorded highest number of pods per plant, higher number of seeds per pod but 100 seed weight is higher in rainfed conditions. The irrigated crop recorded an increase in seed yield of 19.20 % under irrigated condition over rained condition. C-235 produced more number of pods per plant and Pusa 362 produced high number of seeds per pod. Bolder seeds were produced by Pusa 1088

and genotype C-235 had least values of these parameters. Higher yield with Pusa 362 was obtained due to grain size and number of filled pods per plant and also seed number per pod. The highest grain yield and yield attributes were recorded with double spray of 2% urea at 50% flowering and 10 days after 50% flowering. The results also suggested that double spray of 2% urea through foliar application significantly increased the pod number, seed size, number of seeds per pod and 100 seed weight.

Keywords: Rainfed, Seed yield, Biological yield, root weight, Foliar spray of urea, Double spray

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AN ECONOMIC ANALYSIS OF PRODUCTION OF SOYBEAN IN RAJNANDGAON DISTRICT OF CHHATTISGARH

Mahendra Kumar Deshmukh and K.N.S. Banafar

Department of Agricultural Economics, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur Chhattisgarh- 492012

Email: deshmukh2020@gmail.com

Abstract: The present study was conducted in the Rajnandgaon districts of Chhattisgarh. Sixty farmers were selected randomly from three villages namely Ghumka, Botepar and Gidhwa. The primary data were collected for the year 2006-07. The major findings of this study revealed that the average size of holding of the sample households was 3.34 hectares. Production performance of soybean (during 1991-92 to 2006-07) was observed positive and significant growth in Rajnandgaon district as well as Chhattisgarh state. This was mainly due to positive and significant growth in area and production of soybean. Soybean and paddy were the major crops in the study area. On an average the cost of production of soybean calculated as Rs.777.76. Cost of production per quintal of soybean shows decreasing trend with increase in farm size where as cost of cultivation increase with increase in the farm size. Per hectare soybean production and input-output ratio increases with increase in farm size.

Keywords: Production, Economics, Soybean

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INTERACTION EFFECT OF DIFFERENT GENOTYPES AND SPACING ON GROWTH AND YIELD OF ELEPHANT FOOT YAM (*AMORPHOPHALLUS COMPANULATUS DECNE*.) UNDER AGRO-CLIMATIC CONDITIONS OF CHHATTISGARH PLAINS

***Kawach Bhagat, VijayKumar,Karan Sonkar and Jitendra Singh**

Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, Krishak Nagar, Raipur-492012 (C.G.)

**Email-sonkar.karan@gmail.com*

Abstract: The experiment was conducted at Research and Instructional Farm, Department of Horticulture, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) during*kharif* season of year 2010-11. The experiment was laid out in factorial randomized block design with 18 treatment combinations which were replicated three times. The treatment consisted of six genotypes of elephant foot yam *viz;* IGAM-1, IGAM-2, IGAM-8, NDA-2, TRC-Badama and Sree Padma which were planted at different spacing of 50 x50 cm, 60 x50 cm and 60 x 60 cm. The results revealed that the combination G_4 x S_3 (NDA-2) x (50 x 50 cm) recorded maximum sprouting per cent, girth of stem, canopy spread, number of cormels/plant, weight of cormels/plant (kg), corm yield (kg/plant) and total corm yield (q/ha.). The treatment combination G_4 x S_1 (NDA-2) x (60 x 60 cm) recorded maximum size of corm and dry matter per cent of corm. The treatment combination G_2 x S_3 (IGAM-2) x (50 x 50 cm) recorded maximum plant height. The maximum days to first emergence, days to 50% emergence and number of stems/plant was recorded under G_5 x S_1 combination (TRC-Badama) x (60 x 60 cm). The treatment combination G_2 x S_2 (IGAM-2) x (60 x 50 cm) recorded maximum average weight of corms and highest days to senescence was recorded under G_6 x S_1 combination (Sree Padma) x (60 x 60 cm).

Keywords: Genotype, elephant foot yam, spacing

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FIRST REPORT OF A LEAF DISEASE OF RAMBUTAN *(NEPHELIUM LAPPACEUM* L.) PLANT IN INDIA

Dileep. C

Department of Post Graduate Studies and Research in Botany

Sanatana Dharma College Alleppey,Kerala.688 003.India

E.Mail:drcdileep@gmail.com

Abstract: Rambutan *(Nephelium lappaceum* L.) member of the Sapindaceae is a native of Malaysia which is widely cultivated in peninsular India as a cash fruit crop , particularly in Kerala. It is a close relative of the lychee and an equally desirable fruit. In the vernacular, it is generally called rambutan ,occasionally in India, *ramboostan.*
The plant reaches 5-10 m in height, and a dense, usually spreading crown. The evergreen leaves are alternate, pinnately compound, long, with reddish rachis, hairy when young.
Key words : *Nephelium*, *Hemelia*, leaf disease

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CORRELATION AND PATH ANALYSIS OF FRUIT YIELD AND IT'S CONTRIBUTING TRAITS IN BRINJAL (*SOLANUM MELONGENA* L.)

RandhirLalAmbade*, Sunil KumarVerma and Nandan Mehta
Department of Genetics and Plant Breeding, IGKV, Raipur, Chhattisgarh, 492 012, India
**E-mail: randhir.pbg@gmail.com*

Abstract: Correlation and path analysis for yield components and fruit characters was studied in twenty seven crosses using Line x Tester analysis between twelve parents consisted of nine lines (local genotypes of Chhattisgarh) *viz.*, IGB 35, IGB 43, IGB 44, IGB 52, IGB 54, IGB 55, IGB 65, IC 31, IC35 and three testers (improved varieties) *viz.*, DBR 8, KS 224 and JBR 03 16. Highly significant and positive correlation of days to first flowering was observed with days to first fruiting at phenotypic level and it also reported significant negative correlation with number of primary branches per plant at genotypic level and it had significant negative correlation with number of fruits per plant at genotypic level.Path analysis considering total fruit yield per plant as dependent trait indicated that plant height, number of fruits per cluster, number of primary branches per plant and fruit length were most important characters contributing directly towards total fruit yield per plant, indicating effectiveness of simple selection for improvement of these characters.
Keywords: Brinjal, Correlation, Path analysis, Yield

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A CASE STUDY ON DEVELOPMENT OF DISEASE IN RELATION TO WEATHER PARAMETERS ON ALTERNARIA BLIGHT (*ALTERNARIA PORRI*) OF GARLIC

D. Manu[1], A. K. Chandrakar[2], C. K. Chandrakar[2], and I. Dahrey[3]
[1]Department of Plant Pathology, College of Agriculture, Indore, JNKVV, Jabalpur, 482004 (Madhya Pradesh), India, [2]Department of Agronomy, College of Agriculture, Indore, JNKVV, Jabalpur, 482004 (MP), [3]Department of Plant Pathology, IGKV, Raipur
Email of corresponding author – deepshikhamanu@gmail.com, chandrakar22@gmail.com

Abstract: The present study was carried on Alternaria blight (*A. porri*) of garlic on the effect of weather parameters on the development of the disease. Purple blotch development observed a negative correlation with minimum temperature (r = -0.004), relative humidity (r = -0.775) and rainfall (r = -0.258) whereas the maximum temperature (r = 0.870) exhibited a positive correlation with the disease progress**.** The results indicated that the purple blotch was favored by high maximum temperature coupled with low minimum temperature, low relative humidity and low rainfall during the crop seasons.
Keywords: Alternaria blight, Development of disease, Garlic, Weather Parameters

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RESPONSE OF *RHIZOBIUM LEGUMINOSARUM* INOCULATION WITH SULPHUR AND MICRONUTRIENTS ON GROWTH CHARACTERISTICS OF BLACKGRAM (*VIGNA MUNGO* (L.) HEPPER)

Brijesh Kumar Rathi, Anuj Kumar and Sudhir Kumar
Department of Botany, J.V. College, Baraut, (Bagphat)

Abstract: A field trial was conducted during the kharif season of 2002 and 2003 at the research farm of J.V. College, Baraut, to find out the role of *Rhizobium* with sulphur and micronutrients viz. Zn, Mo and B on the cultivar PU-19 and PDU-1 of blackgram. Application of *Rhizobium* along with S @ 60 kg/ha, Zn @ 4 kg/ha, B @ 0.6 kg/ha and Mo @ 0.1 kg/ha significantly increased the growth characteristics in both the cultivar of blackgram. Plant height, number of branches, number of leaves and leaf area increased to a great extent by the application of *Rhizobium* along with sulphur and micronutrients.
Keywords: Blackgram, height, branches and leaves

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INDOLE ACETIC ACID PRODUCTION BY SALT TOLERANT FREE LIVING BACTERIA ASSOCIATED WITH WHEAT RHIZOSPHERE

Adesh Kumar*, K.N. Singh, Suresh Kumar and Satendra Kumar**
Deptt. of Plant Molecular Biology & Genetic Engg., N.D. U. & T., Kumarganj (Faizabad)-224 229
***Department of Soil Science, S.V.P.University of Agriculture & Technology, Meerut-250110*
**Email-adesh.kumar88@yahoo.com*

Abstract: Plant growth promoting rhizobacteria (PGPR) are known to influence plant growth by various direct or indirect mechanisms. In search of efficient PGPR strains with high activity of IAA , a total of 58 isolates belonging to *Pseudomonas, Azotobacter* and *Bacillus* were screened for plant growth promoting trait ie. indole acetic acid (IAA).The eighteen isolates (nine *Azotobacter*, six *Pseudomonas* and three *Bacillus*) were evaluated for quantitative IAA production. All the *Azotobacter* isolates shown to produce higher range (95.60-175.20 µg/ml) of IAA, while *Pseudomonas* produced (44.40- 95.00 µg/ml) IAA. More interestingly all *Bacillus* isolates also shown high potential of producing in the range of 95.60-170.20 µg/ml of IAA. The isolate Azt5, Bc1 and Bc3 tolerated 7% NaCl concentration.

Keywords: PGPR, Wheat Rhizosphere, Indole acetic acid, Salt tolerance

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Keywords: PGPR, Wheat Rhizosphere, Indole acetic acid, Salt tolerance

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Short Communication

EFFECT OF DIFFERENT DOSES OF SPAWN AND AGE OF SPAWN ON SPAWN RUN AND YIELD OF NEW STRAIN IGKVM-11 OF OYSTER MUSHROOM (*PLEUROTUS* SP.).

G. Patel, S.S. Chandrawanshi and A.K. Sahoo*
Department of Plant Pathology, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) 492006, India,
Email-aruns9285@gmail.com

Abstract: Studies were carried to find out the different doses of spawn and age of spawn on the production of new strain IGKVm-11 of oyster mushroom (*Pleurotus* sp.) was studied. Higher dose of spawn was found to be suitable for obtaining higher yield of new strain IGKVm-11 of oyster mushroom (*Pleurotus* sp.) on paddy straw substrate compared to lower rate of spawning and 38 and 18 days old spawn found more suitable for obtaining higher yield of new strain IGKVm-11 of oyster mushroom (*Pleurotus* sp.) on paddy straw substrate.

Keywords: *Pleurotus* sp.; paddy straw; doses of spawn; age of spawn; yield

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Short Communication

EFFICACY OF EDIBLE AND NON-EDIBLE OILS AGAINST PULSE BEETLE *CALLOSOBRUCHUS CHINENSIS* L. IN STORED CHICKPEA

A.K. Sahoo*, H.K. Chandrakar and A.K. Ayam
Department of Entomology, College of Agriculture,
Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) 492012
**Email-aruns9285@gmail.com*

Abstract: The experiment was conducted at laboratory in the Department of Entomology, College of Agriculture, IGKV, Raipur during 2009- 2010 with eight treatments and four replication. While testing the effectiveness of some edible and non-edible oils, minimum no (10.70eggs)of fecundity was recorded on 0.25 ml/100g neem oil treated seeds. In 0.25ml/100g karanj oil treated seed larval-pupal period is longer than control. Higher incubation period (8.13 days) was recorded in neem oil with lower incubation period of 5.39 days, in sunflower oil treated with 0.25 ml/ 100g seed. Adult longevity (5.79 days) was shortest on neem oil at 0.25ml/ 100g seed and longest (7.94 days) on nilgiri oil at 0.25ml/ 100g seed. Seed damage in coconut oil treated seeds at 0.25 ml/ 100g seed was found highest (20.50 and 43.79 per cent) while lowest (9.25 and 30.39 per cent) was found in karanj oil treated seeds 0.25ml/100g seeds after 45 days and 90 days, respectively. Lowest (8.06 and 23.73) weight loss was recorded on karanj oils treatedwith 0.25ml/ 100g seed and highest (16.34 and 35.14 %) was recorded on coconut oil treatedwith 0.25 ml/ 100g seed after 45 days and 90 days. Control of pulse beetle in chickpea with insecticide grain protectants can be dangerous due to its residual effect. Application of edible and non-edible oils to chickpea seeds for storage of the chickpea especially in months of infestation can be an effective alternate.
Keywords: Efficacy, fecundity, incubation, longevity, weight loss

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Short Communication

MARKETING OF PADDY IN MAHASAMUND DISTRICT OF CHHATTISGARH

Sumit Kumar Sori[1], Ku. Sushila[2] and A. K. Gauraha[3]
[1] Agril. Economic,SKCARS, Kabirdham, IGKVV, Raipur, Chhattisgarh.
[2] Agril. Economic,TCBCARS, Bilaspur IGKVV, Raipur ,Chhattisgarh
[3]Dept. of Agril. Economics IGKVV, Raipur, Chhattisgarh
Email: Sori_sumit@gmail.com

Abstract: The study is based on data collected through a survey of 123 farmers and 15 intermediaries/traders carried out during crop year 2010-11 in Mahasamund district of Chhattisgarh. Three stages stratified random sampling technique was adopted for conducting the enquiry from farmers and traders. Cost of paddy marketing for farmers and traders were calculated separately for each channel. The efficiency of the different marketing channels was analyzed by estimating the Shepherd's index. Absolute, percentage and mark-up margin were also calculated for all traders. In the surveyed area, 5 types of middlemen and 4 types of major marketing channels were identified. Channel III was more common in area adopted by 39.02 percent of Farmers for marketing of paddy. Channel IV was observed least efficient with highest marketing cost (Rs. 366.20) and lowest Producer's share in consumer rupee (65.68%). Comparison of Shepherd's index indicated that channel I (12.24) was most efficient followed by channel II (3.28), channel III (3.17) and Channel IV(2.91).
Keywords: Paddy, Marketing cost, Marketing efficiency, Shepherd's Index, Margin.

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Short Communication

SULPHUR MANAGEMENT IN URDBEAN (*VIGNA MUNGO*)-INDIAN MUSTARD (*BRASSICA JUNCEA*) CROPPING SYSTEM IN VERTISOLS

Baldev Ram[1]*, S. S. Punia[1], J. P. Tetarwal[1], D. S. Meena[1], R. S. Narolia[1] and P. R. Raigar[2]
AICRP on MULLaRP, Agricultural Research Station (MPUAT), Ummedganj,
Kota-324001(Rajasthan)
[1] Email-baldev.ram@gmail.com*

Abstract: A field experiment was conducted during two consecutive seasons of *kharif* and *rabi (*2005-06 & 2006-07) at Agricultural Research Station, Ummedganj, Kota to evaluate the optimum dose of sulphur for increasing the productivity and profitability of urdbean and mustard under urdbean-mustard cropping sequence. The experiment was comprised of 3 levels of sulphur (0, 20 and 40 kg/ha) to each urdbean and mustard and consisted of 9 treatment combinations (U_0-M_0, U_0-M_{20}, U_0-M_{40}, U_{20}-M_0, U_{20}-M_{20}, U_{20}-M_{40}, U_{40}-M_0, U_{40}-M_{20} and U_{40}-M_{40} kg/ha) were tested in randomized block design with four replications. Sulphur fertilization to urdbean 40 kg/ha significantly increased plant height/plant, branches/plant, nodules/plant, nodule dry weight, number of pods/plant, seeds/pod and test weight, seed yield, straw yield, net return and B:

C ratio over no sulphur application while it remained statistically on par with 20 kg S/ha. The respective increase was in the magnitude of 7.7, 33.1, 39.5, 23.6, 35.6, 33.9, 8.4, 13.6, 16.2, 55.0 and 9.6 % over no sulphur. Maximum and significantly higher plant height, primary and secondary branches/plant, siliquae/plant, length of siliqua, seeds/siliqua, test weight, seed, stover yield, net return and B: C ratio were recorded in mustard with application of U_{40}-M_{40} kg S/ha remained on par with U_{20}-M_{40} and U_{40}-M_{20} kg/ha over no sulphur, U_0-M_{20}, U_0-M_{40}, U_{20}-M_{20} and U_{40}-M_{20}. Treatment U_{20}-M_{40} kg S/ha recorded significantly higher urdbean equivalent yield to the tune of 1107 kg/ha, net return 16267/ha, total S uptake 14.21 kg/ha and higher buildup of S 7.49 kg/ha over U_0-M_0 (no sulphur).
Keywords: Cropping system, Mustard, Net return, Sulphur, Uptake, Urdbean, Yield

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Short Communication

STUDIES ON GROWTH AND YIELD PARAMETERS OF GUAVA (*PSIDIUM GUAJAVA* L.) CV. L-49 THROUGH DRIP IRRIGATION AND MULCHING UNDER AGRO-CLIMATIC CONDITION OF CHHATTISGARH PLAINS

Karan Sonkar, S.N. Dikshit and D.Sharma
Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya,
Krishak Nagar, Raipur-492012 (C.G.)
**Email-sonkar.karan@gmail.com*

Abstract: The experiment was carried out during the year 2009-2010 in Randomized Block Design (RBD) with five replications and eight treatments allocating mulching with different irrigation levels viz., 100%, 80% and 60% of water through drip and flood irrigation. The guava variety L-49 was taken with the objectives to study scheduling of irrigation under drip irrigation system, to workout the water requirement of guava and to assess the effect of black plastic mulch on growth and yield parameters of guava. The use of 80 per cent water through drip irrigation with plastic mulch was found effective for guava plants. The plants in respect of canopy spread, number of fruits per plant, fruit yield per plant and per hectare, days to 50 % flowering (minimum), days to fruit maturity (minimum) were found superior under 80 per cent water through drip with plastic mulch. While, highest plant girth and more number of primary branches were observed under 100 per cent of water through irrigation by flood system. The maximum number of leaves and twigs was observed with the treatment 60 % of water through drip irrigation.
Keywords : Drip irrigation, mulching, guava, growth and yield

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Short Communication

QUALITATIVE ASSESSMENT OF *PSEUDOMONAS* ISOLATES ASSOCIATED WITH WHEAT RHIZOSPHERE FOR PHOSPHATE SOLUBILIZING ACTIVITY AND SALT TOLERANCE

Umesh Kumar Shukla, Adesh Kumar, Kundan Kumar, Suresh Kumar, Ramesh chand and *Satendra Kumar
Department of plant Molecular Biology and Genetic Engineering, N.D.University of agriculture and Technology, Kumarganj,Faizabad, U.P., India, 224229
**Department of Soil Science, S.V.P. University of Agriculture and Technology, Meerut 250110*
Email-Adesh.kumar88@yahoo.com

Abstract: Plant growth promoting rhizobacteria (PGPR) are known to influence plant growth by various direct or indirect mechanisms. The plant growth promoting attributes *viz*. production of indole-3-acetic acid (IAA), gibberellins, siderophore, and phosphorus solubilization etc. ability of the rhizobacteria are the most common. The Phosphorus Solubilizing bacteria are used as plant growth promoting bacteria (PGPB). In search of phosphorus solubilizing *Pseudomonas* associated with wheat plants grown in various locations of Uttar Pradesh, we have isolated a total of sixteen strains on the kings,B medium and identified as *Pseudomonas* spp. .Phosphorus solubilizing capabilities as demonstrated by the formation of clearing zone on the pikovaskya medium. Out of 16 *Pseudomonas* strains, only 9strains were found able to solubilize phosphorus. All the *Pseudomonas* strains were screened for salt tolerance. Most of the *Pseudomonas* strains shown tolerance up to 8% NaCl concentration. Only 3 *Pseudomonas* strains were able to grow even at 10% NaCl concentration.
Keywords: Phosphate, Pseudumonas, Rhizobacteria, Wheat