

Selection of Rice Varieties for Specific Location in Boro Season : GIS Approach

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ABSTRACT

This study was conducted to identify and delineate geographical areas suitable for rice genotypes- BRR1 dhan28, BRR1 dhan29, BRR1 dhan36 and BRR1 hybrid dhan1 during Boro season 2003. Maps of suitable areas have been produced for growing those varieties. The southwestern and northern parts of Bangladesh appeared to be equally suitable for cultivation of all the tested varieties. All those varieties gave higher grain yield in medium high and medium low lands having clay to loamy textured soil. The most suitable areas have been estimated as 49, 64, 47 and 25% of total Boro areas for BRR1 dhan28, BRR1 dhan29, BRR1 dhan36 and BRR1 hybrid dhan1 respectively.

Development of Soil Fertility Map at Village Level for Rice Production

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ABSTRACT

The study was undertaken in Pirganj upazila under Thakurgaon district to compare farmer's perception of soil fertility with soil test based results, to delineate soil nutrient map and to facilitate nutrient management decision at micro level. Soil samples were collected at 0-15 cm deep having latitude and longitude reference and analyzed for different nutrient status. The mouza map was screen digitized with ARC View 3.2 and built in ARC/Info 3.5.1 to 1:10,000 scales. Soil samples were geo-referenced with geographic positioning system (GPS) and the map was used for spatial analysis soil nutrient data. Different soil test values were used to make individual nutrient surface using inverse distance weight (IDW) interpolation method. Farmers' perception about the fertility of their farm was moderate to low. Soil of that locality is acidic in nature, sandy loam to sandy clay loam soil having low organic matter content. Most of the soils were fair to good in phosphorus (P) status in rice-non rice growing area, but deficit in Rice-Rice growing area. Almost all soils were deficit in potassium (K) in the study area. Zinc content is fairly adequate in most soils of the farm. Calcium (Ca) and magnesium (Mg) were below critical level for growing rice. Soil fertility map showed that the soil fertility status of the Shibpur village was slightly different than farmers' perception. Based on the total fertility status of Shibpur village a fertilizer guideline has been prepared for sustainable rice production, which can be followed for rice production in the similar agroecological zones of Bangladesh.

Water Stress and Nutrient Solution Electrical Conductivity (EC) on Rice Plant I. Photosynthetic Gas Exchange Aspect

K P Halder¹ and S W Burrage²

ABSTRACT

The effect of intermittent drought stress and nutrient solution electrical conductivity (EC) on net photosynthesis rate and leaf gas exchange of rice plants grown using nutrient film technique (NFT) was evaluated. Continuous circulation of nutrient solution throughout the life cycle (CC); Water stress was imposed 15 days after transplanting to panicle initiation stage (VS); Water stress was imposed from panicle initiation (PI) to maturity (RS); Water stress was imposed from 15 days after transplanting to maturity (WS) and two level of nutrient solution EC (3.0 mS cm^{-1} and 2.0 mS cm^{-1}) were used. Regardless of nutrient solution EC, the stomatal conductance, net photosynthesis rate and transpiration rate decreased, whereas leaf temperature increased in stressed plant. When water stress treatment was withdrawn from the VS plants, there was a partially recovery in stomatal conductance, net photosynthesis rate and rate of transpiration.

Water Stress and Nutrient Solution Electrical Conductivity (EC) on Rice Plant II. Water Relation Aspect

K P Halder¹ and S W Burrage²

ABSTRACT

Rice plants were grown using nutrient film technique (NFT) to evaluate the effect of intermittent drought stress in terms of solar radiation (1.20 MJ m^{-2}) received by the plant and nutrient solution electrical conductivity (EC) on water uptake, leaf water potential (LWP), leaf relative water content (RWC) and water use efficiency (WUE). Drought stress decreased water uptake, RWC and LWP in plants under both vegetative and reproductive growth phases. When drought stress was withdrawn from the VS plants there was a tendency to increase water uptake, RWC and LWP. Plants grown in EC 3.0 solution took up significantly ($P < 0.001$) more water than EC 2.0 plants. There was no significant ($P > 0.05$) difference between EC 3.0 and EC 2.0 plants for RWC and LWP.

Water Stress and Nutrient Solution Electrical Conductivity (EC) on Rice Plant III. Yield and Yield Component

K P Halder¹ and S W Burrage²

ABSTRACT

The influence of water deficit and nutrient solution EC and their interaction on the yield and yield component of rice were studied by using nutrient film technique (NFT). Intermittent water stress was imposed during vegetative and reproductive phases of the crop. Nutrient status of the solution was maintained by adjusting solution EC and intermittent drought stress was maintained by stopping the circulation of nutrient solution until the plants had received 1.20 MJ m⁻² solar radiations. Results revealed that regardless of solution EC, the unstressed plants produced the highest grain yield (9.0 to 11.8 t ha⁻¹) followed by vegetative phase stressed plant (7.3 to 7.4 t ha⁻¹), reproductive phase stressed plant (5.5 to 6.0 t ha⁻¹) and continuously stressed (3.7 to 4.2 t ha⁻¹) plant. In unstressed treatment, the EC 3.0 plants produced more grain yield (11.8 t ha⁻¹) compared to EC 2.0 plants (9.0 t ha⁻¹) but in the stressed treatment; there was no significant difference between EC 3.0 and EC 2.0 plants. Due to stress, the grain yield decreased more (38.6-68.4%) in plants grown in solution EC of 3.0 than in EC 2.0 (18.6-53.2%) plants.

Genotypic and Seed Age Response on Germination and Early Seedling Growth to Salinity in Modern Rice

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ABSTRACT

Genotypic and seed age response on germination and early seedling growth at varied salinity levels were examined. Unaged (normal seed) and controlled deteriorated (45 °C for 24, 30, 36, 42 or 48 hr) rice seeds were subjected to germination using paper towel method. Ageing up to 24 hr had no deleterious effect on seed germination. However, ageing for 36 and 48 hr reduced length and rate of extension of plumule and radicle. Mild ageing (24 and 30 hr) stimulated growth of plumule and radicle and also germination, especially in intermediate vigour seeds indicating metabolic repair. Severe ageing (>30 hr) reduced both plumule and radicle growth largely and similarly. No correlation was found between the performance of rice genotypes in salt condition (unaged) and their performance in water after elevated ageing. Salt-sensitive variety IR8, salt-tolerant variety BR23 along with BRRI dhan29 had good quality seed. Salt-tolerant breeding lines BR5331-93-2-8-4, BR5778-156-1-3 and BR5828-11-1-4 were identified with poor quality seed. Seed quality of BR1192-2B-35, BR5331-93-2-8-3, BR5842-15-4-8 and BRRI dhan31 were found to be intermediate.

Effect of NaCl on Germination, Plumule and Radicle Growth of Some Modern Rice Genotypes

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ABSTRACT

Salt tolerance at germination and early stages of seedling growth was examined in eight modern rice genotypes and compared with salt-tolerant check variety, BR23 and salt-sensitive check variety, IR8 at 0, 50, 100, 150, 200 and 250 mM salinity. Germination percentage decreased significantly at 100-250 mM salt concentrations and there were also significant differences between the cultivars. Germination was mainly affected at and above 150 mM salt concentrations and cultivar differences were clear at 200 and 250 mM. In BR5331-93-2-8-4, BR5778-156-1-3, BR5828-11-1-4 and BR23 more than 75% germination even at 250 mM salt were recorded. Germination rate decreased with increasing NaCl concentrations which differed between genotypes. Rice genotypes were substantially more tolerant to salt during germination than in early stages of seedling growth. Salt solutions significantly reduced plumule and radicle growth. The plumule growth was more affected than radicle. Seedling fresh weight decreased, whereas seedling dry weight increased with increasing salinity. The variation between rice genotypes in germination and in early seedling growth performances might be genetic or related to seed quality.

Genetic Variability, Character Association and Path Coefficient Analysis for Physiological Trait in a Diallel Cross of Rice

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ABSTRACT

An experiment was carried out to investigate genetic variability, character association and path coefficient analysis for physiological trait in an eight-parent half diallel crosses of rice. BRRI dhan29, BR4828-54-4-1-4-9, BRRI dhan28, IR8, Amol3, IR65610-38-2-4-2-6-3, Minikit and ZhongYu7 were chosen as parents. The highest genotypic, environmental and phenotypic variance was found in total leaf area (TLA) at 50% flowering followed by TLA at 45 days after transplanting (DAT) and grain yield/plant. TLA at 50% flowering, leaf area index (LAI), crop growth rate (CGR), net assimilation rate (NAR) and relative growth rate (RGR) had high genetic coefficient of variation (GCV) and phenotypic coefficient of variation (PCV). High heritability associated with high genetic advance was also obtained in TLA at 50% flowering, LAI, CGR, NAR, RGR and grain yield/plant. Genotypic correlation coefficients were higher than the phenotypic correlation coefficients in most of the cases, which suggested that character association had not been largely influenced by environment. Grain yield/plant was positively and significantly associated at both genotypic and phenotypic level for TLA at 45 DAT and at 50% flowering, CGR and harvest index (HI). The highest positive direct effect on grain yield was obtained by leaf thickness followed by LAI and CGR. High positive indirect effects on grain yield were obtained by TLA at 50% flowering and at 45 DAT through LAI followed by RGR through CGR.

Extrapolation of Domain of a Proven Resource Conservation Technology : Crop Establishment by Chinese Hand Tractor Seeder in Rice-Wheat Systems

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ABSTRACT

Extrapolation of domain of crop establishment by Chinese Hand Tractor (CHT) seeder, a resource conservation technology in rice-wheat systems has been made using Geographic Information System (GIS) tools. Land type, slope, top soil texture, soil moisture, permeability, drainage, soil depth and soil consistency were considered for suitability of wheat crop establishment by CHT. Gerater Jessore, Kushtia, Chuadanga, Rajshahi, Natore, Bogra, Dinajpur, Rangpur, Comilla and Noakhali districts and very small area in Cox's Bazar district found suitable for establishing wheat crop by CHT. Most of Bangladesh soils are moderately suitable. A gross area of suitable and moderately suitable for tilling the land with CHT was estimated as 2.17 (15%) and 7.46 (50%) million hectares, respectively.

Effect of Genotype and Modified MS Medium on Callus Induction and Subsequent Morphogenesis in Dehusked Rice Seed Culture

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ABSTRACT

An experiment was conducted to find out the effect of genotype and modified MS medium on callus induction and morphogenesis in rice seed culture. Maximum callusing was noticed in BRRI dha28 followed by Bashful Balam and Kalijira, respectively. High plantlet regeneration was observed in the plated calli of Kalijira. Different concentrations of MS basal salts in callus inducing medium also affected formation and regeneration of plantlets. Dehusked mature seeds inoculated on the medium, with 80% MS basal salts produced maximum calli, whereas higher plantlet regeneration rate was observed from the calli induced on the medium containing 60% MS basal salts.

Effect of Soaking Water Temperature and Soaking Duration on Quality of Parboiled Rice

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ABSTRACT

Quality of parboiled rice at three levels of water temperature (50, 60 and 70°C) and three levels of soaking duration (1, 2 and 3 hrs) was assessed. Soaked paddy was parboiled at 100°C for 20 minutes and then dried and milled. Among the treatments, three hours soaking in hot water of 70°C could raise higher water content in grain during soaking and higher head rice recovery by 82.5%. Three hours soaking of paddy at 70°C resulted in the lowest whiteness (25%) and the highest hardness (5.1 kgf). Whiteness of rice decreased with increasing water temperature and duration of soaking time.

Floral Biology of Four Aromatic Rice Varieties

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ABSTRACT

An experiment was conducted at the experimental farm of Central Luzon State University, Science City of Munoz, Nueva Ecija, Philippines during dry season, 2002 to study the floral biology of four aromatic rice. Basmati 385 had larger stigma breadth and stigmatic area, longer filament, greater duration of floret opening, wider angle of floret opening and higher panicle exertion. Super basmati showed higher stigma exertion rate that enhance cross-pollination and longer anther length, the desirable male floral trait. Kasturi had longer anther breadth and anther size but Basmati 370 had longer stigma length.

Farmer's Participatory Variety Selection of Deepwater Rice

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ABSTRACT

Farmer's participatory variety selection (FPVS) is the selection of varieties by the farmers in the farmer's field condition. Two FPVS trials of deepwater rice, one with five advanced lines under shallow water depth (<1.0 m) at six locations and other with seven local deep water rice (DWR) cultivar were tested under deep flooded conditions at five locations of Faridpur and Madaripur Districts in 2001. The advanced line IR64588-47-3-2-2B-12-1-2-3 produced the highest grain yield (2.32 t/ha) followed by IR64588-47-3-2-2B-9-1-2-3 (2.27 t/ha) compared to a farmer variety laxmidigha (2.05 t/ha) in shallow water depth. The crop duration of these lines were almost same with farmer's check variety. The highest grain yield was obtained from Birpala (2.38 t/ha) followed by Digha and HbjAVIII (2.04 t/ha) under deep flooded conditions. Farmer's variety (Gabura) produced the lowest grain yield (1.89 t/ha). But crop duration was the lowest for farmer's variety Gabura (188 days) followed by Digha (193) and Birpala (196 days).

Genetic Diversity in Irrigated Rice

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ABSTRACT

Fifty irrigated rice genotypes originating from Bangladesh, IRRI (Philippines), Japan, China and Indonesia were subjected to cluster analysis. The genotypes were constellated into five distinct groups. The inter-cluster distance in most cases was larger than the intra-cluster distance suggesting wider genetic diversity among the genotypes of different groups. Maximum inter-cluster distance was observed between genotypes of cluster III and I followed by cluster III and IV. Closer affinity of Bangladeshi traditional varieties was observed though they belong to different clusters. Most of the breeding lines were included in single cluster indicating homogeneity in their pedigree. Plant height, panicle length, grains/panicle and grain yield/hill mainly contributed to the highest divergence between cluster III and I. The genotypes in cluster III and IV showed moderate to high inter-cluster distance with those in cluster I, II and V indicating the possibility to obtain heterotic progenies with high yielding ability, earliness along with desirable traits if the genotypes from former clusters are crossed with those from the latter ones.

Opinion of Block Supervisors on Environmental Hazards and Associated Problems due to Continuous and Intensive Rice Cultivation

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ABSTRACT

The purpose of this study was to investigate the opinion of Block Supervisors (BSs) on environmental hazards and associated problems due to continuous and intensive rice cultivation and to explore relationships of selected characteristics of BSs with their opinion. Data were collected through personal interviews from Kalihati and Ghatail upazilas of Tangail district. Majority (65%) of the BSs expressed highly favourable and 35% moderately favourable opinion on environmental hazards and associated problems due to continuous and intensive rice cultivation. Significant positive correlation was found between the BSs opinion and their education, training received, organizational participation, newspaper exposure, radio exposure, knowledge about rice farming, knowledge on agrochemicals and attitude towards use of agrochemicals.

Rice Seed Processing Technology in Bangladesh and Thailand

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ABSTRACT

This study was conducted at selected sties of Thailand in 2001 to gather information on improved post-harvest rice technologies for disseminating in Bangladesh. Data revealed that majority of the farmers of Bangladesh and Thailand used their own seeds and some of them buy seeds from the neighboring farmers. Farmers' method of seed selection and processing were far below the standard method. In Thailand, about 100% respondents used combine harvesters to shorten harvesting period and to save labour costs while in Bangladesh matured crops are harvested by sickles. Most of the respondents in Thailand used old fertilizer bags for storing seeds.

Performances of Modern Rice Varieties in T. Aman Season under Farmer's Management Conditions in Northern Region of Bangladesh

M M A Mondal¹

ABSTRACT

Seventeen modern rice varieties were tested in Rangpur and Dinajpur during T. Aman seasons of 2000 and 2001 for determination of varietal performances along with farmer's reaction for its cultivation. BRRI dhan36 produced the highest grain yield (5.23 t/ha) followed by BRRI dhan31 and BR11, but it was very short stature with poor straw yield and quality. BRRI dhan33 matured in 121 days, others matured in 126-166 days depending on varieties. Farmers preferred BR11 for its higher grain yield, BRRI dhan32 for its early maturity and acceptable yield potential and that of BRRI dhan34 for its scented grains. A massive extension of BR11, BRRI dhan31, BRRI dhan32 and BRRI dhan34 is suggested for commercial cultivation in Rangpur-Dinajpur regions for keeping pace with population growth of the country

Combining Ability and Heterosis in Indica Rice

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ABSTRACT

Six parental diallel crosses without reciprocals were studied to determine general combining ability (GCA), specific combining ability (SCA) and heterosis for yield and component characters of rice. The GCA and SCA variances were highly significant for all the characters studied. The relative proportions of components suggest preponderance of non-additive gene effect in the expression of all the traits except plant height, panicle length and 1000 grain weight. BR683-65-4-1-1-1(C) was good general combiners for most of the characters including grain yield. IR64588-47-2B-12-1-2-3 also showed good GCA effects for grain yield, plant height, flag leaf area, panicles/plant and 1000 grain weight. Good general combining ability for yield coupled with earliness was found in DWC-B-14-X-1-6. IR64588-47-2B-12-1-2-3 × BR683-65-4-1-1-1(C), IR60436-B-65-2 × BR683-65-4-1-1-1(C) and IR55166-4R-215-1 × IR64588-47-2B-12-1-2-3 were the best specific crosses for grain yield. Performance and heterosis over mid parent and better parent were also high in these crosses indicating their potentials for developing desirable transgressive segregates and in exploitation of hybrid vigor for developing heterotic rice hybrids.

Effect of Phosphorus on Submergence Tolerance of Rice (*Oryza sativa* L.) Seedling

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ABSTRACT

An experiment was carried out at Bangladesh Rice Research Institute (BRR), Gazipur during 2004 to study the survivability and recovery ability of submerged rice seedling in response to phosphorus (P) content. The experiment consisted of five P concentration, 0.5, 3, 5, 10 and 15 ppm with two varieties, FR13A and BR11. With the increasing P concentration survival percentage and recovery increased up to 10 ppm P. Survival percentage and tolerance level to submergence irregularly increased in FR13A but the increase was steady in BR11 up to 10 ppm P. Irrespective of variety, 10 ppm P gave the highest survivability and recovery from submergence. The survival percentage decreased at 15 ppm P in both the varieties. The degree of positive relationship between percent survival and percent P content of seedling was slightly higher ($r = 0.899$) in BR11 compared to tolerant variety FR13A ($r = 0.869$). After 30 days recovery from submergence the growth characteristics like plant height, tiller number and dry matter were the highest at 10 ppm P with both the varieties. It is concluded that culture media containing 10 ppm P induces maximum tolerance and recovery of submerged rice seedling.

Nitrogen Management for Over-aged Seedlings of Short Duration Variety in Aman Season

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ABSTRACT

The experiments were conducted at Bangladesh Rice Research Institute (BRR), Gazipur during Aman season of 2005 and 2006. The influence of N rate (80 and 120 kg ha⁻¹) and its management was investigated with variable seedling ages (20, 40 and 60 day-old) of BRR dhan33, a short duration variety. Heading of mother plants was observed at 7-10 days after transplanting (DAT) for 60 day-old seedlings and heavy application of N fertilizer at that stage reverted the reproductive phase to vegetative phase and initiated new tillers. Grain number per unit area decreased by 22-25% with 60 day-old seedlings compared to 20 day ones following BRR recommended N rate and application schedule. But when 120 N/ha was applied, of which 2/3rd at 7-10 DAT and 1/3rd at panicle initiation (PI) stage was applied, grain number reduction was only 11%. Spikelet sterility was higher with over-aged seedlings. The highest grain and straw yields were obtained from 20 day-old seedlings and the least from 60-day old seedlings when BRR recommended N application schedule was followed. The modified N rate and its application schedule increased grain and straw yields of 60 day-old seedlings by 15 and 22%, respectively. Eighty kg N ha⁻¹ at 7-10 DAT and 40 kg N ha⁻¹ at PI stage could be suitable application schedule for older seedlings to get comparatively satisfactory grain yield in Aman season.

Determination of the Smallest Plot Size for Estimating Plant Characters and Yield of Transplanted Rice

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ABSTRACT

Quality of the field experiments data dependent upon adequate experimental design. This study investigated the smallest plot size for estimating different plant characters and yield of transplanted rice. The experiment was conducted in Boro 2000-01 and Boro 2001-02 as two-factor factorial experiment in a randomized complete block (RCB) design with three replications. Factor 1 is the plot size with three levels: 1 - x 1 - m, 2 - x 2-m and 3 - x 3-m and factor 2 is the cultural management. BRR1 dhan29 with spacing 20- x 20-cm was cultivated and plant height, tiller number, panicle length, numbers of filled and unfilled grain, spikelet/panicle, 1000-grain weight and yield data were collected. Results indicate that for field experiments with rice, the experimental plots may be made as small as 1-x1-m for estimating the plant characters except yield. If yield is of primary importance, the plot size should not be smaller than 4 m².