P 3.06 - Performance of contrasted rice genotypes grown under water saving irrigation and trait discovery for genotype improvement

Bueno C.S. [1], Lafarge T. [1,2] (tanguy.lafarge@cirad.fr), Bucourt M.[1]

[1] Crop and Environmental Sciences Division, International Rice Research Institute, DAPO Box 7777, Metro Manila, Philippines;
[2] Centre International de Recherche en Agronomie pour le Développement, UPR Adaptation Agroécologique et Innovation Variétale, Montpellier, F-34398, France.

Water saving technologies without reduction on grain yield, like alternate wetting and drying (AWD), have been implemented successfully in irrigated rice fields. It is now needed to identify key crop traits under more pronounced water constraint for genetic improvement and further increase in water productivity. Five contrasted genotypes were grown under three water treatments in 2006 (AWD30 with irrigation set up whenever soil water potential reached -30 kPa at 15 cm deep, AWD60, and CF as continuous flooding) while nine genotypes were grown under two water treatments in 2008 (AWD30 and CF). While water use decreased significantly for all genotypes by 29% to 37% under AWD30 and by 22% to 34% under AWD60 in 2006DS, and by 17% to 25% in 2008DS, grain yield was maintained only in rare cases which expressed high contrast among genotypes' responses: grain yield of PSBRc80 was maintained in all situations while that of IR64 was significantly and systematically affected. The response of yield components to AWD was, however, not consistent with regard to the performance: cases with stable grain yield included some with unaffected yield components (three genotypes) and others with compensation between panicle number and filled grain number per panicle (PSBRc80). Cases with reduced grain yield included some with reduced grain size (two genotypes including IR64) and others with reduced filled grain number per panicle (two genotypes). Tiller emergence rate and maximum tillering increased under AWD for all genotypes, however, effect on LAI and biomass accumulation was inconsistent. Partitioning to culm was favored under AWD to the detriment of blade during the reproductive phase of the most adapted genotypes in 2008 although this was not reported in 2006. Under CF, the root/shoot ratio, total root dry matter and root dry matter below 25 cm deep were consistently higher, but for the most three adapted genotypes only. As a response to AWD, the root/shoot ratio and total root dry matter of these genotypes were maintained (in 2006) or even increased (in 2008) while those of a genotype bred for aerobic conditions were rather low under CF, but its partitioning to root dry matter at deep layers increased strongly under AWD. Although the plant type and traits responsible to AWD adaptation were not clearly consistent among the promising genotypes under study, the size, distribution and adaptation of the rooting system were clearly identified as key crop traits for adaptation to alternate wetting and drying.

P 3.07 - Water deficit stress on some physiological and agronomical characteristics of sunflower new hybrids

Daneshian J.[1] (j_daneshian@yahoo.com), Jonoubi P.[2]

[1] Seed and Plant Improvement Institute, Karaj, Iran;
[2] Tarbiat Moalem University, Tehran, Iran.

Water deficit stress effect was studied on new sunflower hybrids. Two experiments were conducted as base of complete Randomized block design in 2005. Eleven Hybrids as name as SHF 81/82, SHF 81/85, SHF 81/33, SHF 81/75, SHF 81/60, SHF 81/90, SHF 81/115, SHF 81/108, SHF 81/84, SHF 81/36, SHF 81/95 and CMS 26* R-103 produced by Iranian CMS and Restorers lines and four commercial hybrids as, Azargol, Allstar, Mehr, Hysun33 were compared in two water conditions. In the first experiment, all plots were irrigated after 60 mm evaporation from pan, class A. In the second experiment, plots irrigated after 180 mm evaporation from pan. There were significant differences in morphological and physiological traits, yield and its relative characteristics to water deficit. However, hybrids reactions were different to water conditions. Some hybrids improved root extension, therefore they adsorbed much water in the soil in water deficit condition. They had the lowest head reduction among others. There were positive and significant correlations between stem diameter and water deficit tolerance. Water deficit caused to reduce leaf numbers and areas in plants, but the most reduction occurred in sensitive

hybrids. They produced the lowest yield. The tolerant hybrids controlled stomata conductance and had more Relative Water Content in leaves than sensitive hybrids. Productivity effort that indicated remobilization of assimilate to development organs were different in hybrids to water deficit. It was reduced by water deficit, but the percentage of reduction was low in some hybrids. Water deficit sensitive and tolerant indices as MP, GMP, STI, SSI and TOl were studied. The yield in good water and water deficit conditions had positive and significant correlations with MP, GMP and STI indices. Azargol and Hysun33 Were the best hybrids because they produced the highest seed in two water condition. They were late maturity hybrids and there were positive correlation between growth duration and water deficit tolerant, because of good root growth, SHF 81/85 and SHF 81/108 had the lowest reduction in stomata conductance, RWC, leaf number and stem diameter. Therefore, the had the lowest seed reduction among new hybrids.

P 3.08 - Drought tolerance evaluation of new potato varieties with large root system in the comparison of commercial variety

Deguchi T., Tago A., Wangchuk P., Iwama K. (iwama@res.agr.hokudai.ac.jp), Jitsuyama Y., Naya T., Miura Y.

Graduate School of Agriculture, Hokkaido University, Sapporo 060-8589, Japan.

Potato plants are very sensitive to drought, mainly due to their shallow root system. We bred new potato (*Solanum tuberosum* L.) cultivers 'Konyu' with high productivity and large root mass in 2007. To evaluate their drought tolerance, a field experiment under irrigated and progressively droughted soil conditions was carried out. Root length density, photosynthetic rate, stomatal conductance and leaf water potential were compared between 'Konyu' varieties and widely cultivated commercial variety, Konafubuki, with high tuber starch yield and small root mass. Total root length and leaf water potential of 'Konyu' varieties were significantly higher than those of Konafubuki regardless of water treatment. In droughted plot, leaf water potential showed significant positive correlations with stomatal conductance and photosyn- thetic rate. Although all varieties showed significant yield reduction in progressively droughted plot relative to irrigated plot, 'Konyu' varieties showed smaller reduction than Konafubuki. We concluded that large root mass of Konyu varieties could maintain better water status and contributed to less reduction of photosynthetic rate and tuber yield even in progressively droughted condition.

P 3.09 - Determining relationships among yield and some yield components using path coefficient analysis in chickpea (*Cicer arietinum L.*)

Fayyaz F. (Fayyaz.Farzad@Gmail.com), Talebi R.

Department of Field Crops Improvement, Faculty of Agriculture, Azad University, Sanandaj, Iran.

This research was conducted to determine the relationships among yield and some yield components by using correlation and path coefficient analysis. The experiment was carried out in the experimental field Kharke Sanandaj in 2006. In this study, 36 chickpea cultivars were used. The experimental design was Triple Lattice Design. Positive and significant relationships were found among seed yield and number of pods per plant, number of seeds per pod, biological yield and harvest index. Negative and non significant relationships were determined among seed yield and 100-seed weight, number of primary branches, days to flowering, days to first pod formation and days to maturity. According to path coefficient analysis, there were strong direct effects of the harvest index (0.901), biological yield (0.194) and number of pods per plant (0.048) on the seed yield.