Asian Journal of Crop Science

ISSN 1994-7879

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Olive Mill Wastewaters: Diversity of the Fatal Product in Olive Oil Industry and its Valorisation as Agronomical Amendment of Poor Soils: A Review

S. Hanifi and I. El Hadrami

Discharge of olive mill wastewaters is known to have adverse effects on environment. Several scientific treatment technologies were proposed for these effluents. However, they are limited by some economical and technical constraints. Olive mill wastewaters direct agronomical recycling is both classical and innovative alternative for removal of these pollutant effluents. However, this procedure can still not be recommended as safe practice because data is often inconsistent and the physico-chemical characteristics of olive mill wastewaters are not the same depending on several intrinsic and extrinsic aspects. This review compiles and discusses the results of studies conducted worldwide over the last two decades on the effects of olive mill wastewaters as soil amendment. It particularly focuses on OMW associated eco-toxicity and the capability of the biotic and abiotic components of soils to overcome it. Moreover, it explores olive mill wastewaters bio-transformation in soils and also their potential environmental impact. *(Journal of Agronomy 8 (1): 1-13, 2009* ***doi:*** *10.3923/ja.2009.1.13)*

Impacts of Conservation Tillage Systems on Long-Term Crop Yields

Kenneth R. Olson and Stephen A. Ebelhar

The 20 year study was conducted in Southern Illinois (USA) on land similar to that being removed from Conservation Reserve Programme (CRP) to evaluate the effects of conservation tillage systems on maize and soybean yields and for the maintenance and restoration of soil productivity of previously eroded soils. The effects of tillage on soil loss from erosion and Soil Organic Carbon (SOC) change were determined. The No-Till (NT) system had significantly less soil loss from erosion and maintained more SOC than the Mouldboard Plough (MP) and Chisel Plough (CP) tillage systems. The 10 year average maize yields were slightly higher for MP than NT and CP systems as a result of a significantly higher maize yield in the first year. The 10 year average NT soybean yield was slightly higher than for the MP and CP tillage systems. Crop yields for 10 years maize and 10 years soybean appear to show long-term productivity of NT compared favorably with that of MP and CP tillage systems. *(Journal of Agronomy 8 (1): 14-20, 2009* ***doi:*** *10.3923/ja.2009.14.20)*

Effects of Design Parameters of a Cultivator Share on Draft Force and Soil Loosening in a Soil Bin

T. Marakoğlu and K. Çarman

This experimental study was performed with the aim to evaluate effects of design parameters of a cultivator share on draft force and soil loosening in a soil bin. The test tool variables included rake angle to the horizontal of 12.5, 17.5 and 22.5°, working depths of 70, 110 and 150 mm and forward velocity of 1.08, 1.55 and 2.08 m sec^{-1}. Measurements were taken of draft force and disturbed area of soil by the cultivator share. The resulting draft force was increased with increasing rake angle, forward velocities and working depth. The draft force in different trials varied from 42 to 202.5 daN. The area disturbed of soil was larger when tool rake angle, forward velocity and working depth were increased. The greatest disturbed area occurred at rake angle of 22.5°, forward velocity of 2.08 m sec^{-1} and depth of 150 mm. The soil loosening increased with rake angle and forward velocity but loosening decreased with increased working depth. The soil loosening varied from 21.07 to 40.45%. *(Journal of Agronomy 8 (1): 21-26, 2009* ***doi:*** *10.3923/ja.2009.21.26)*

Influence of Genotypes and Potassium Application Rates on Yield and Potassium Use Efficiency of Potato

F. Karam, Y. Rouphael, R. Lahoud, J. Breidi and G. Colla

Two year experiment (1999-2001) was conducted at Tal Amara Research Station in the Bekaa Valley of Lebanon to evaluate the influence of progressive application of Potassium fertilizer on yield, tuber quality, potassium uptake and potassium use efficiency (KUE) of 4 potato (*Solanum tuberosum* L.) genotypes. Four levels of potassium [0 (K_0), 96 (K_{96}), 192 (K_{192}) and 288 (K_{288}) kg K_2O ha^{-1}) and 4 genotypes (Spunta and Derby in 1999; Shepody and Umatilla in 2001) were used in a split-plot design. Medium and large grade tubers and aggregate tuber yield increased quadratically with increasing K application rates up to 192 kg K_2O ha^{-1}, reaching a plateau thereafter, indicating the luxury consumption of the nutrient at 288 kg K_2O ha^{-1}. When averaged over year and K application rates, Spunta, Derby and Umatilla followed by Shepody exhibited the highest aggregate yield. Tuber K uptake increased in all genotypes with increasing K application rates. A genetic variation in tuber potassium uptake was recorded, with the highest values observed on Derby and Umatilla, followed by Shepody and finally on Spunta. When averaged over genotypes, K_{192} treatment resulted in 19 and 61% higher KUE value than those recorded by K_{92} and K_{288} treatments, respectively. Finally,

when averaged over K rates, the KUE of Spunta was higher by 2, 36 and 11% than those observed on Derby, Shepody and Umatilla. *(Journal of Agronomy 8 (1): 27-32, 2009* ***doi:*** *10.3923/ja.2009.27.32)*

A Study on the Morphological and Physicochemical Characteristics of Five Cooking Bananas

T. Ayala-Silva, R.J. Schnell, A.W. Meerow, J.S. Brown and G. Gordon

The objective of the present study conducted during July 2006 to July 2008 seasons was to evaluate 5 varieties of cooking bananas under calcareous soil and irrigation conditions. The number of suckers per mat, height at flowering, cycling time, bunch number and weight, productivity index (PIX), brix and color were determined. Mean total fruits were highly significantly different for Bom, Pelipita and Blue Torres with 107, 63 and 51 total fruits, respectively. Mean total number of hands per bunch was highly significant for Bom (8.30) followed by Pelipita (6.0). Gypungusi and Cacambou demonstrated the lowest number of hands with 4.5 and 4.2, respectively. Pelipita, Cacambou and Blue Torres had the highest brix levels with 14.65, 12.72 and 12.57, respectively. Results obtained demonstrate that the color of skin can be objectively measured by the use of a colorimeter. The susceptibility of the varieties to yellow or black Sigatoka, caused by *Mycosphaerella* sp., was also evaluated. External (visual) evaluation of disease graveness was made three times during the experiment. A skewed scale of 1-5 where, 1 = vigorous and 5 = dead was used. Results showed that all the varieties have resistance/tolerance to Sigatoka and should be considered for production in areas affected by this disease. All cultivars but Blue Torres Island, produced reasonable to high yields of good to exceptional fruit, hence are recommended for use in tropical/subtropical areas with a dry season and limestone soils. *(Journal of Agronomy 8 (1): 33-38, 2009* ***doi:*** *10.3923/ja.2009.33.38)*

Technical and Economical Evaluation of Traditional vs. Advanced Handling of Tomatoes in Jordan

Najib El Assi, Amer Jabarin and Hmoud Al-Debei

Tomato (*Solanum lycopersicom* L.) fruit cv. "508" grown in plastic houses were obtained from two farms located in the Uplands and Jordan Valley. Fruits were harvested at the pink to light-red stages of development. Fruit samples were either kept as packed by the farmer (Group 1-traditional handling) or handled by the working team (Group 2-advanced handling). Harvesting was repeated three times with a week interval between harvests. Two main treatments were applied to the

fruit samples: either held at 22°C continuously or at 12°C for 10 days and then removed to 22°C to the end of the experiment. Soluble Solid Content (SSC), firmness, water loss, decay and defects and shelf life were evaluated at 0, 10 and 20 days. Crop enterprise budgets are used in economic analysis to estimate the profitability of agricultural products High temperature inflicted serious deteriorative consequence evident by accelerating the rate of loss of firmness (softening), increasing weight loss and decay incidence, aggravating defects and reducing the shelf life of the fruits held at 22°C. Similarly, improper and rough handling (traditional handling) exerted detrimental effects clearly pronounced in fruits from group 2. Higher economic profits are obtained from tomatoes of the advanced handling comparable to those of the traditional handling. *(Journal of Agronomy 8 (1): 39-44, 2009* ***doi:*** *10.3923/ja.2009.39.44)*

Performance of Some Tomato (*Lycopersicon esculentum* Mill.) Varieties under Heat Period in Northern Nigeria

B.H. Kabura, P.E. Odo and A. Abubakar

An experiment to evaluate the performance of five different varieties of tomato (*Lycopersicon esculentum* Mill.) under heat period was carried out at Maiduguri, Nigeria. The 5 varieties used were, Dan-Syria, Roma VFN, UTC, Dan-Baga and Tandino which were arranged in a Randomized Complete Block Design (RCBD), with three replications. The varieties varied in their yield characteristics. The varieties Roma VFN and Tandino started flowering 40 Days After Transplanting (DAT) earlier than the other varieties used. The Roma VFN, generally, produced significantly ($p \leq 0.05$) greater number of fruits/plant and fresh weight of fruits/plant than the other varieties used. Consequently, the Roma VFN, produced the highest fresh fruit yield of 6.1 mt ha^{-1}. The variety Dan-Baga produced the lowest fruit yield ha^{-1}, which was 2.6 mt ha^{-1}. The results of the study suggest that among the varieties used in the experiment, Roma VFN was more tolerant to heat followed by Tandino which surpassed the rest. *(Journal of Agronomy 8 (1): 45-48, 2009* ***doi:*** *10.3923/ja.2009.45.48)*

Field Application of Processed Manure upon Water Quality and Crop Productivity

Paul Walker, Walt Kelly, Ken Smiciklas and Tim Kelley

The purpose of this study was to conduct an applied field study investigating the feasibility of utilizing processed liquid swine manure in crop production. Four

treatments were evaluated; unprocessed liquid swine manure, processed liquid effluent, inorganic nitrogen fertilizer and zero-rate control. For shallow subsurface water (as measured by lysimeters), the inorganic nitrogen fertilizer treatment had the greatest levels of nitrate-N. However, there were no significant differences for any measured chemical parameter for groundwater (as measured by sampling wells) among the four treatments. In general, the zero-rate control treatment was the lowest yielding treatment for corn (*Zea mays* L.), in contrast to the equivalent response of the other treatments. Nutrient accumulation was similar for the four treatments, with the exception of greater plant manganese content of the inorganic nitrogen fertilizer treatment. For soybean (*Glycine max* L.), all four treatments responded in a similar fashion. After 5 years of annual treatment application, the processed liquid effluent and unprocessed manure treatments were similar for most soil parameters. In addition, soil and plant tissue samples were evaluated for pathogenic organisms (total coliform and *Escherichia coli*) and non-detectable levels were found for all treatments. The results of this study indicate the processed liquid swine effluent produced in this study, inorganic nitrogen fertilizer and unprocessed manure had similar effects on crop characteristics and subsurface water quality. *(Journal of Agronomy 8 (2): 49-59, 2009* ***doi:*** *10.3923/ja.2009.49.59)*

Biochemical Composition Effect of the Some Cereal Species' on the Behaviour of *Sitophilus granarius* L. and *Rhyzopertha dominica* F. Species in Semi-Arid Zone of Setif, Algeria

A. Mebarkia, A. Guechi, S. Mekhalif and M. Makhlouf

The aim of this study is the effect of the trophic medium on the biotic potential of the two species, *Sitophilus granarius* L. and *Rhyzopertha dominica* F. and the relationship between biological observations and the quantitative loss induced by the development of insects. The quality and sensibility of cereals influential the behaviour of the 2 pests. The average descent was influenced by the cereal type. Therefore, in specific mono-population, the average emergence per day, for the corn, varies from 0.61 for *S. granarius* L. to 0.12 for *R. dominica* F.; on the other hand for the soft wheat, it varies from 4.35 to 5.81, respectively. Whereas, in hetero-specific population, sensibility of the various cereals types to the attacks by *R. dominica* F. increases in the presence of *S. granarius* L., for an initial rate of infestation of 2 couples. The reverse was observed if the rate of infestation was doubled. The longest duration of development was observed for the corn with 40 and 55 days for *S. granarius* L. and *R. dominica* F., respectively. Shortest was recorded for the rice with 28 and 42 days for both. The highest loss of dry

matter, in soft wheat with 4.74 and 6.09% for *R. dominica* F. and *S. granarius* L., respectively, while in corn was less than 1%. *(Journal of Agronomy 8 (2): 60-66, 2009* ***doi:*** *10.3923/ja.2009.60.66)*

Evaluation of Digital Hemispherical Photography and Plant Canopy Analyzer for Measuring Vegetation Area Index of Orange Orchards

S. Khabba, B. Duchemin, R. Hadria, S. Er-Raki, J. Ezzahar, A. Chehbouni, A. Lahrouni and L. Hanich

This study presents the results of an evaluation of two indirect methods (Plant Canopy Analyzer (PCA) and hemispherical photographs) for measuring Vegetation Area Index (VAI) of two orange orchards, differing by their ground fraction cover (f_c). The evaluation is based on reference data obtained by destructive measurements on limited samples, which allow to calibrate and validate an exponential relationship between the diameter of branches and associated areas of leaves ($R^2 = 0.99$). The obtained results show that the two indirect methods underestimate the reference values of VAI. For the PCA device, the best estimates of VAI are obtained using the five rings for high f_c ($f_c = 0.7$) and using only four rings for low f_c ($f_c = 0.3$). For both case, the hemispherical photographs give accurate estimates of VAI: the relative errors are about 11 and 14% for high and low f_c, respectively. Alternatively, a simple method consisting of calculating VAI as the weighted average of the maximum (VAI_{max}, below the tree) and minimum (VAI_{min}, at the center of four trees) values using f_c as a weighting factor, was successfully tested ($R^2 = 0.90$). For both indirect methods, the tree volumes are well estimated with comparison to the values calculated assuming an ellipsoidal form. *(Journal of Agronomy 8 (2): 67-72, 2009* ***doi:*** *10.3923/ja.2009.67.72)*

Certain Physical and Chemical Traits in Selected Oilseed Crops

A.A. Kandil, M.S. Sultan, A.E. Sharief and W. El-Batrwy

Physical and chemical traits of oils from 5 soybean cultivars, three peanut cultivars, three sesame cultivars and 2 sunflower genotypes from two field experiments at the experimental station, Mansoura University, Egypt during the 2 summer seasons of 2006 and 2007 were studied. Results indicated that we can identify soybean. Giza 21 cultivar with highest values of oil percentage, saponification number, ester number and specific weight of seeds compared with other studies cultivars. Giza

35 cultivar could recognize with highest values of iodine number and Giza 22 cultivar can identify with more red and yellow color of oil compared with other studies cultivars in both seasons. Concerning peanut Giza 4 cultivar can identify by higher in moisture percentage and specific weight of seeds, more red color of oil and peroxide number compared with other studied cultivars. It possibly will be confirmed that Giza 6 cultivar could recognize with highest percentages of oil, iodine number, acid number, saponification number, ester number and more yellow color of the oil in both seasons compared with studied cultivars. Regarding sesame Taka 2 cultivar can identify by higher values of oil percentage, iodine number, saponification number, ester number, red and yellow color of oil and moisture percentage of seeds compared with studied cultivars. Giza 32 cultivar can recognize with highest values of acid number and peroxide number compared with studied cultivars in both seasons. In view of sunflower, Line 102 can identify with higher values of oil percentage, acid number peroxide number, saponification number, ester number, red color of oil and specific weight compared with Line 53 in both seasons. *(Journal of Agronomy 8 (2): 73-78, 2009* ***doi:*** *10.3923/ja.2009.73.78)*

Effects of Arbuscular Mycorrhizal Fungus on the Mineral Nutrition and Yield of *Trifolium alexandrinum* Plants under Salinity Stress

S. Shokri and B. Maadi

The aim of this study was to evaluate the effects of arbuscular mycorrhizal fungus on the mineral nutrition and yield of *Trifolium alexandrinum* plants under different salinity levels (2.2, 5 and 10 dS m^{-1}). A pot experiment was conducted under glasshouse conditions in 2007. The results showed positive effects of inoculation with mycorrhizal fungi on total dry weight, root length and nutrient uptake of the *T. alexandrinum* at high and low salinity levels. Mycorrhizal colonization increased Total Dry Weight (TDW) of mycorrhizal plants 5.29 times more than control plants. In shoot system of non-AM plants, Na^+ concentration was increased while the concentrations of K^+, Mg^{2+} and Ca^{2+} were decreased with raising salinity stress. The Na^+ level in shoots of AM plants showed slight increase with raising salinity levels. This experiment showed that phosphorus levels in the plants were reduced with increasing salinity but the AM plants showed higher values of phosphorus at all salinity levels. Thus, it could be concluded that AM fungi increased phosphorus uptake and saline stress in plants was thereby alleviated. *(Journal of Agronomy 8 (2): 79-83, 2009* ***doi:*** *10.3923/ja.2009.79.83)*

Impact of Irrigation and Nitrogen on Determining the Contribution of Yield Components and Morphological Traits on Corn Kernel Yield

M. Edalat, S.A. Kazemeini, E. Bijanzadeh and R. Naderi

This study was conducted to investigate the impact of irrigation and nitrogen on determining the contribution of yield components and morphological traits on corn kernel yield. Treatments were nitrogen in four levels (0, 75, 150 and 225 kg N ha^{-1}) and three irrigation intervals (7, 10 and 14 days) in 2005 and 2006 at the Kooshkak Agricultural Experiment Station, Fars, Iran. The result of stepwise regression between kernel yield and yield components showed that, kernel number per ear (R^2 = 0.8192) and kernel weight per ear (R^2 = 0.0697) had the most proportion in kernel yield variation (Cumulative R^2 = 0.8889). Irrigation levels significantly affected kernel yield. Similar to kernel yield, maximum biological yield (17090 kg ha^{-1}) was obtained at 7 days intervals. With increasing nitrogen levels plant height was increased and its maximum value (201.2 cm) was observed at 225 kg N ha^{-1}. Results of N and irrigation interaction effects showed that the highest kernel yield obtained at 225 kg N ha^{-1} and 7 days intervals irrigation (10213 and 8570 kg ha^{-1}, respectively). *(Journal of Agronomy 8 (2): 84-88, 2009* ***doi:*** *10.3923/ja.2009.84.88)*

Characterization of Oil and Fatty Acid Composition in Seed Produced by Canola Regrowth

Harbans L. Bhardwaj and Anwar A. Hamama

Canola (*Brassica napus* L.) and its relatives are known to regrow after harvesting of the foliage. However, yield and oil characteristics of seed harvested from regrowth are unknown. An experiment was conducted to obtain such information. Pre-flowering foliage was harvested from 48 plots (cut plots) grown in virginia during 2001-02 season. A group of 48 companion plots (uncut plots) was left unharvested. Upon harvesting of foliage, these plots received a factorial combination of four rates each of P and K fertilizers (0, 50, 100 and 200 kg ha^{-1}). Both sets of plots had previously received 100 kg ha^{-1} each of N, P and K. All 96 plots were harvested at maturity and data on seed yield and oil characteristics were recorded. The results indicated that seed yield from regrowth was 67% of uncut plots (1349 vs. 2020 kg ha^{-1}). The oil content in regrowth plots was significantly lower than that in uncut plots (34.7 vs. 37.1%). However, the oil from regrowth plots was considered healthier since, it contained less saturated and more

unsaturated fatty acids. Effects of P and K fertilizers on canola regrowth were variable. An additional experiment with a factorial combination of three rates each of N, P and K (0, 50, 100 kg ha^{-1}) applied to the cut plots indicated that N rate effects were non-significant whereas increasing rates of P and K increased C18:0 and C18:3 fatty acids. Earlier research in virginia has established that pre-flowering canola foliage can be harvested to yield 11 Mg ha^{-1} of fresh greens and 1 Mg ha^{-1} of dry matter. Present results demonstrate the potential of canola as a dual purpose crop to enhance the income of small farmers. It could be harvested before flowering as a value-added feed/food product and the regrowth could be harvested for seeds to provide edible oil. *(Journal of Agronomy 8 (2): 89-92, 2009* ***doi:*** *10.3923/ja.2009.89.92)*

The Relationships of Sorghum Kernel Pericarp and Testa Characteristics with Tannin Content

Suqin Cheng, Yi Sun and L. Halgreen,

A practical approach for determining tannin contents is very useful for sorghum breeders. Tannin contents were determined with vanillin-HCl method for 24 sorghum entries varying in origin, pericarp color, presence or absence of testa and testa color. The relations of these kernel characteristics with their tannin contents were investigated. It was revealed that dark color pericarp produces trace amount of tannins, while the tannin contents in the sorghum cultivars with purple testa were much lower than those with brown testa. Subdivision of type 1 and type 2 sorghum was proposed to provide sorghum breeders more practical classification system for selecting cultivars with suitable tannin contents. *(Asian Journal of Crop Science 1 (1): 1-5, 2009;* ***Doi:*** *10.3923/ajcs.2009.1.5)*

Fixation of Urea to Polyacrylic Acid and Nitrogen Release Behavior of the Product (Polyurea)-A Comparison with Urea and Control (Without Nitrogen Fertilizer)

M.H. Rahman, B.K. Das, M.A.J. Miah and H. Ahmad

A slow-release nitrogen fertilizer was prepared by covalently immobilizing urea on a biodegradable acrylic acid based polymer matrix. Polyacrylic acid was prepared by solution polymerization of acrylic acid followed by covalent immobilization of urea through the activated carboxyl groups. The resulting product, termed as polyurea, was characterized by FTIR and NMR spectral analyses, thin layer

chromatography measurement and elemental analyses. Results showed that polyurea contained 24.76% nitrogen and the solvency reduced to over 300 times as compared to urea. To clarify the performance of this polyurea in agriculture, a comparative study was then carried out on the growth of green chili *Capsicum annuum* plants using urea and control (no nitrogen fertilizer) as the basis. Polyurea showed improved yield in terms of average plant size over the cultivation period. The nitrogen release behavior in soil during cropping and plant uptake of nitrogen suggested that polyurea can be used as slow-release nitrogen fertilizer. *(Asian Journal of Crop Science 1 (1): 6-14, 2009;* ***Doi:*** *10.3923/ajcs.2009.6.14)*

Genotype×Environment Interaction for Resistance to Purple Blotch (*Alternaria porri* L. (Ellis) Cif.) in Onion (*Allium cepa* L.) in Nigeria

L. Abubakar and S.G. Ado

Five onion cultivars were crossed in a diallel and their progenies evaluated at Sokoto and Talata Mafara, during the 2004/2005 and 2005/2006 seasons. Thirty milliliter of 10^{-1} cfu of spore suspension of *Alternaria porri* was poured into each plot. Combined analysis indicated that location, recorded highly significant mean squares ($p<0.01$) for disease incidence, fresh and cured bulb yields. Genotype recorded highly significant ($p<0.01$) mean squares for all characters. Genotype×location interactions recorded highly significant ($p<0.01$) mean squares for disease incidence and severity and fresh and cured bulb yields. *(Asian Journal of Crop Science 1 (1): 15-25, 2009;* ***Doi:*** *10.3923/ajcs.2009.15.25)*

Unmarketable Tuber Yield and Other Agronomic Parameters of Four Varieties of Irish Potato (*Solanum tuberosum* L.) as Influenced by NPK Fertilizer Rate and Type of Seed Tuber at Samaru, Nigeria

B.A. Babaji, E.B. Amans, U.F. Chiezey, A.M. Falaki, B. Tanimu and A.A. Mukhtar

This research was initiated with the aim at finding varieties of Potato that can respond to graded levels of NPK fertilizer and form of seed tuber. The treatments tested consist of four rates of NPK fertilizer (0, 300, 600 and 900 kg ha^{-1}), two forms of seed tuber (whole and cut-tubers) and four varieties of Irish potato

(Greta, Nicola, RC 767-2 and WC 732-1). A split-plot design was used in which the factorial combinations of fertilizer rate and form of seed tuber were assigned to the main plots while the varieties occupied the sub-plots. The treatments were replicated three times. Varieties Nicola and RC 767-2 had the heaviest and least leaf and stem dry weights, respectively. Nicola, RC 767-2 and WC 732-1 produced more tubers and unmarketable tuber yield than Greta. Greta and RC 767-2 produced larger tubers than Nicola and WC 732-1. The highest NPK rate of 900 kg ha^{-1} resulted in the heaviest leaf and stem. Optimum tuber number and size was attained at the higher fertilizer rate of 600 kg ha^{-1}. Further increase above 600 kg NPK ha^{-1} depressed tuber number and tuber weight in 1997/98 and tuber size in 1998/99. The same 600 kg NPK ha^{-1} recorded the least unmarketable tuber yield. None of the factor measured was affected by type of seed tuber. In conclusion RC 767-2 had the highest plant dry weights as well as more tubers and unmarketable tuber yield that were comparable to that of Nicola and WC 732-1. Greta and RC 767-2 had larger tubers than the other two varieties. The plant dry weights were optimized at 900 kg NPK ha^{-1} while more tubers of larger size were maximized at 600 kg NPK ha^{-1}. The medium NPK rate of 600 kg ha^{-1} had least unmarketable tuber yield. Planting of either whole or cut tuber sett did not affect any of the parameter. *(Asian Journal of Crop Science 1 (1): 26-33, 2009;* ***Doi:*** *10.3923/ajcs.2009.26.33)*

Effect of Sugarcane Molasses and Whey on Silage Quality of Maize

Gerardo Uriel Bautista-Trujillo, Mario A. Cobos, Lucía María Cristina Ventura-Canseco, Teresa Ayora-Talavera,

The potential of cane molasses and whey as additives to ensile maize plants (*Zea mays* Linnaeus) was investigated. Maize stem plus leaves were chopped, mixed with cane molasses and whey, placed in cylindrical plastic containers, hermetically closed and characterized. The pH of the silage decreased significantly in each of the treatments with a faster decrease found when whey was added. The lactic acid concentration was > 60 g kg^{-1} in silage amended with molasses and/or whey and 41 g kg^{-1} in the control treatment after 15 days. Acetic acid was the only volatile fatty acid detected in the silage of maize and its concentration was 7.3 g kg^{-1} when whey was added, but 16.2 g kg^{-1} in the control treatment. In conclusion it was shown that maize plants can be effectively ensiled with whey in combination with sugarcane molasses as additives inducing a faster production of lactic acid and resulting in a better silage product. *(Asian Journal of Crop Science 1 (1): 34-39, 2009;* ***Doi:*** *10.3923/ajcs.2009.34.39)*

Effects of Organic and Chemical Fertilizers on Forage Yield and Quality of Globe Artichoke (*Cynara scolymus* L.)

E. Fateh, M.R. Chaichi, E. Sharifi Ashorabadi, D. Mazaheri, A.A. Jafari and Z. Rengel

To study the effect of organic and chemical fertilizers on forage yield and quality in globe artichoke (*Cynara scolymus* L.) an experiment was conducted using a randomized completed block design (RCBD) with four replications at the Research Farm of College of Agriculture, University of Tehran, Karaj, Iran in 2006. The treatments included five levels of chemical fertilizers, four levels of manure, five levels of mixture of different ratios of chemical fertilizers and manure (integrated system) and a control treatment without any fertilizers. Fertilization treatments significantly affected forage quantity and quality of artichoke. For chemical fertilizers, total DM yield was increased to 4.13 and 3.7 t ha^{-1} by the treatments (kg ha^{-1}) $N_{200}/P_{200}/K_{240}$ and $N_{160}/P_{160}/K_{192}$, respectively. For organic systems, the highest yields of 2.86 and 2.77 t ha^{-1} were obtained by treatments of 30 and 40 tones of cattle manure/ha, respectively. In the integrated system, the highest DM values of 4.86 and 4.06 t ha^{-1} were obtained in treatments $N_{80}/P_{80}/K_{96}/manure_{20,000}$ and $N_{120}/P_{120}K_{144}/manure_{10,000}$, respectively. The effects of three soil fertilization systems on forage quality traits were inconsistent. Chemical and integrated systems increased crude protein (CP), K and P contents in globe artichoke. For dry matter digestibility (DMD) there were no significant differences among fertilizing systems, although all of them produced higher DMD compared to control. For water-soluble carbohydrates (WSC), the positive effect of organic fertilization was higher than in the other two systems. It was concluded that artichoke, as a new forage crop, has a good yield and quality potential for livestock feeding in terms of soil fertilization systems But further studies would be needed for considering of Artichoke as a new source of forage crops. *(Asian Journal of Crop Science 1 (1): 40-48, 2009;* ***Doi:*** *10.3923/ajcs.2009.40.48)*

Some Physiological Parameters and Sugar Concentration Changing of Sugar Beet (*Beta vulgaris* L.) Under Controlled Climatical Conditions

A. Yadollahi and Z. Shojaei Asadiyeh

This research was conducted to investigate the impact of night temperature and light intensity on growth indices and sugar content of sugar beet (Triploid Multigerm Iran-Karaj 1 variety, type N-E) in a Mediterranean climate

(North West of Iran) at Moghan Agro-industry and Livestock Co. from April 2001 to February 2002. Its lower sugar contents were reported than those normally grown in other sugar beet growing regions. Sugar beet crops were cultivated with full automatic controlled environment (night temperature and light intensity) facilities in an experimental farm. Data were collected 80 days after planting using a completely randomized block design with four replications using 7 treatments. The treatments consisted of night temperature 15°C (T_1) and 10°C (T_2), increase of light intensity (L), night temperature 15°C and increase of light intensity (T_1L), night temperature 10°C and increase of light intensity (T_2L), a greenhouse control (C_1) and a control without greenhouse (C_2). The total dry matter and leaves area of sugar beet were measured to calculate the growth indices including shoot crop growth rate, total crop growth rate, leaf area index and net assimilation rate from 20 days after planting. After 140 days, some samples were taken from the roots of sugar beet and pulp in order to determine the sugar content. This sampling procedure was carried out every 10 days up to 210 d ays after planting. Model development showed that the best equation, $Y = ae^{bx}$ (Y is the sugar content, e, the napery logarithm, a and b are coefficient and x is one of the growth indices), was obtained from data regression. The growth indices were negatively correlated well ($p<0.001$) with sugar content. Hence, the low sugar content could be due to the warm nights and slight light intensity during days. *(Asian Journal of Crop Science 1 (1): 49-57, 2009;* ***Doi:*** *10.3923/ajcs.2009.49.57)*

Optimum Rice Density and Herbicide Application in Direct Seeding in Ahwaz Region, Iran

S.H. Mussavi, Kh. Alamisaeid, Gh. Fathi, M.H. Gharineh, M.R. Moradi-Telavat and A. Siahpoosh

In order to investigate of rice and barnyard-grass in different levels of herbicide and crop density, an experiment was conducted in split plot design with four replicate, in research farm of Ramin Agriculture and Natural Resources University in 2006. Four herbicide doses (0, 3, 5 and 7 L ha^{-1}) was arranged in main plots and three seeding rates (100, 120 and 140 kg seed ha^{-1}) in subplots. Interaction of herbicide and crop density on dry matter and yield of rice and barnyard-grass was significant. Therefore, response of variance trends of these traits to herbicide in different densities was different. While no herbicide was be used, rice yield in density 120 was higher than other densities, that showed that optimum crop density could increased crop competition ability and decreased herbicide use. In other hand, it be observed that highest and lowest yield of crop and weed,

respectively, was be related to 5 L herbicide ha^{-1}. In this case, there was little difference between different densities. With more herbicide use, probably due to toxicity effect, crop yield decreased. However, in this herbicide dose, density 120 showed lesser changes in crop yield. In density 120, crop and weed yield relationship have lesser slope in comparison with other densities. Ultimately, it seems that optimum crop density can lessen crop sensitivity to other environmental and agronomic factors including weed competition and herbicide use. *(Asian Journal of Crop Science 1 (1): 58-62, 2009;* ***Doi:*** *10.3923/ajcs.2009.58.62)*

Identification of *Stevia rebaudiana* Bertoni Proteins by Sodium Dodecyl Sulphate Polyacrylamide Gel Electrophoresis

Ma Lei and Shi Yan

Four diverse genotypes of *Stevia rebaudiana* Bertoni were included for Sodium Dodecyl Sulphate Polyacrylamide Gel Electrophoresis (SDS-PAGE) analysis. Total proteins were analyzed through slab type SDS-PAGE. Based on SDS-PAGE, specific bands were suggested to be used for identifying *Stevia rebaudiana* Berton. This method has the advantages of simplicity, high sensitivity and good accuracy and the SDS-PAGE proved to be a powerful tool for differentiating *Stevia rebaudiana* Bertoni varieties. *(Asian Journal of Crop Science 1 (1): 63-65, 2009;* ***Doi:*** *10.3923/ajcs.2009.63.65)*

Heterosis and Combining Ability in a Diallel Cross of Eight Faba Bean (*Vicia faba* L.) Genotypes

Salem S. Alghamdi

The present investigation was carried out under insect-free cages during the three successive seasons 2004-2006. A diallel cross excluding reciprocals among eight faba bean genotypes was used to estimate the heterotic effects of F_1 crosses and F_2 populations relative to their respective mid and better parents and combining ability analysis for yield and some of its variables. Highly significant differences among the tested entries were detected for different traits, indicating wide genetic variability for all traits. Heterosis percentages relative to mid-parents were significantly positive in several crosses with a range of 15.6-19.7, 38.0-59.8, 85.0-131.4, 74.3-79.4, 54.4-127.2 and 69.8-142.0% for plant height, number of branches per plant, number of pods per plant, number of pods per main stem, number of seeds per plant and seed yield per plant, respectively. However, heterosis percentages relative to better parent were significantly positive in

some crosses and recorded a range of 19.0-19.0, 54.2-73.7, 62.9-97.7 and 47.6-129.9% for plant height, number of pods per plant, number of seeds per plant and seed yield per plant, in the same order. Some crosses exhibited significantly negative heterosis compared to respective mid-parent for days to flowering (from -9.0-23.5%). The ratios of $(\sigma^2_{gi}/\sigma^2_{si})$ exceeded the unity for number of pods per plant, number of pods per main stem and 100-seed weight indicating that the genetic variation among these traits appeared to be additive. However, low $(\sigma^2_{gi}/\sigma^2_{si})$ (less than unity), revealed the predominance of non-additive gene action for days to flowering, plant height, number of branches per plant, number of seeds per plant and seed yield per plant. The three parental genotypes: Aquadulce, Luz and Giza 716 were found to be a good combiners for 100-seed weight. Moreover, the parental genotype Geizera 2 was a good combiner for both number of pods and seed yield per plant. Three parents Geizera 2, Giza 402 and Triple white were good combiners for earliness. Five crosses Geizera 2×Giza 716, Geizera 2×Sakha 1, Geizera 2×Giza 402, Giza 716×Sakha 1 and Giza 716×Giza 402 had significant Specific Combining Ability (SCA) for most studied traits. *(Asian Journal of Crop Science 1 (2): 66-76, 2009;* ***Doi:*** *10.3923/ajcs.2009.66.76)*

Response of Different Tomato Cultivars to Diluted Seawater Salinity

A. Al-Busaidi, S. Al-Rawahy and M. Ahmed

Pot experiments were carried out to evaluate the effects of saline irrigations on five varieties of tomato (4, 22, 38, 46 and 54). Plants were irrigated with diluted seawater adjusted to three levels of electrical conductivity; freshwater (control), 3 and 6 dS m^{-1}. The results of the experiment showed that saline water remarkably affected the evapo-transpiration rate, soil moisture, salts accumulation and plant biomass production. Saline irrigation had the ability to keep much water in the soil with higher value of salt content. Low salinity treatment exhibited highest plant growth and lowest soil moisture and salts deposition. Varieties number 38 and 46 gave the highest values for fruits number and weight. Whereas, variety number 22 got the lowest values. However, variety No. 4 was the tallest and had the highest value for green matter even under high salinity treatment. Overall, under saline condition it was observed that all plant parameters of different varieties were reduced compared to the control except for the number of fruits of some varieties such as 38, 46 and 54. However, fruit fresh weight for variety number 38 was enhanced by saline irrigation which could be a good sign for salt tolerance in saline conditions. *(Asian Journal of Crop Science 1 (2): 77-86, 2009;* ***Doi:*** *10.3923/ajcs.2009.77.86)*

Effects of Humic Substances on Plant Growth and Mineral Nutrients Uptake of Wheat (*Triticum durum* cv. Salihli) Under Conditions of Salinity

Barış Bülent Aşık, Murat Ali Turan, Hakan Çelik and Ali Vahap Katkat

The effects of foliar and soil application of humic substances on plant growth and some nutrient elements uptake of wheat (*Triticum durum* Salihli) grown on various salt concentrations were examined. Sodium chloride was added to soil to obtain 15 and 60 mM saline conditions. The solid humus was applied to the soil one month before planting and the liquid humic acid was sprayed twice on the leaves on day 20 and 35 after seedling emergence. The application doses of solid humus were 0, 1 and 2 g kg^{-1} and the liquid humic acids were 0, 0.1 and 0.2%. Salinity negatively affected the growth of wheat; also decreased the dry weight and the uptake of nutrient elements except for Na and Mn. Soil application of humus increased the N uptake of wheat and foliar application of humic acid increased the uptake of P, K, Mg, Na, Cu and Zn. Although the effect of interaction between salt and soil humus application was found statistically significant, the interaction effect between salt and foliar humic acid treatment was not found significant. Under salt stress, the first doses of both soil and foliar application of humic substances increased the uptake of nutrients. *(Asian Journal of Crop Science 1 (2): 87-95, 2009;* ***Doi:*** *10.3923/ajcs.2009.87.95)*

Agronomic Performance of Paprika (*Capsicum annuum* L.) in Response to Varying Plant Populations and Arrangement in the Smallholder Sector of Zimbabwe

S. Mavengahama, V.B. Ogunlela and I.K. Mariga

The effect of plant population and spatial arrangement on the agronomic performance of paprika (*Capsicum annuum* L.) was studied on-farm in the Chinyika Resettlement Area (CRA) of Zimbabwe during 2000-2003 cropping seasons. The treatments were factorial combinations of four plant population densities (35000, 50000, 65000 and 80000 plants ha^{-1}) and two plant arrangements (single and double-row planting). The experimental design was a randomized complete block design with four replications. When plant population increased from 35000 through to 65000 plants ha^{-1} total fruit yield increased 21.6-64.7% but yield declined 23.7% at 80000 plants ha^{-1} in the 2000/01 season. Significant response to plant population was up to 80000 plants ha^{-1} in the 2001/02 season. In the 2000/01 season, marketable fruit yield increased by

48.1% when plant population was increased from 35000 to 65000 plants ha^{-1}. Total fruit yield per plant and number of fruits per plant responded significantly ($p<0.05$) to variation in plant population in the 2000/01 season up to 65000 plants ha^{-1}. Above this population fruit yield per plant and plant height declined significantly. In the 2001/02 season, number of fruits per plant and plant height did not respond to variation in plant population. Generally, row arrangement had no significant influence on fruit yield except total fruit yield and number of fruits/plant that were higher under 2-row planting than under one-row in the 2000/01 season. Results suggest that increasing plant population from 55000 to above 65000 plants ha^{-1} caused significant increase in total fruit yield and that 2-row planting can give higher fruit yields per hectare and per plant as against the one-row planting. *(Asian Journal of Crop Science 1 (2): 96-104, 2009;* ***Doi:*** *10.3923/ajcs.2009.96.104)*

Study on Differences of Nitrogen Efficiency and Nitrogen Response in Different Oilseed Rape (*Brassica napus* L.) Varieties

Zhen-hua Zhang, Hai-xing Song, Qiang Liu, Xiang-min Rong, Jian-wei Peng, Gui-xian Xie and Yu-ping Zhang

Field experiment was carried out to evaluate the nitrogen efficiency and nitrogen response under no nitrogen application and nitrogen application conditions. The differences of grain yield, nitrogen absorption amount, nitrogen response and nitrogen use efficiency among 16 winter varieties of oilseed rape (*Brassica napus* L.) were systematically studied and the contribution of nitrogen absorption efficiency and nitrogen use efficiency to nitrogen efficiency in different oilseed rape varieties were preliminarily discussed. Results showed that, the differences of grain yield, nitrogen use efficiency and nitrogen response among the 16 oilseed rape varieties were significantly, regardless of N application level; but only under no N application conditions, the differences of nitrogen absorption amount among varieties were significantly. The 16 oilseed rape varieties were divided into four different genotypes in accordance with the nitrogen use efficiency and nitrogen response under no nitrogen application condition: (1) Nitrogen High Efficiency-Nitrogen High Response, included Xy1, Xy16, Xy17, Xh19, Xh20 and Xy21. (2) Nitrogen Low Efficiency-Nitrogen Low Response (NLE-NLR), included Xy6, Xy8 and Xy9. (3) Nitrogen High Efficiency-Nitrogen Low Response (NHE-NLR), included Xy7, Xy12, Xy14, Xy15 and Xy24. (4) Nitrogen Low Efficiency-Nitrogen High Response (NLE-NHR), included Xy11 and Xy13. The variation coefficient of nitrogen use efficiency was higher than nitrogen absorption efficiency, regardless of N application level; it was also

showed that the contribution of nitrogen use efficiency to nitrogen efficiency was higher than nitrogen absorption efficiency. However, variation coefficient of nitrogen absorption efficiency under nitrogen application condition was higher than under no N application condition; variation coefficient of nitrogen use efficiency was reverse. It was indicated that, under no N application condition, the variation of nitrogen efficiency because of nitrogen use efficiency was decreased and variation of nitrogen efficiency because of nitrogen absorption efficiency was increased. *(Asian Journal of Crop Science 1 (2): 105-112, 2009;* ***Doi:*** *10.3923/ajcs.2009.105.112)*

Nitrous Oxide (N_2O) Emissions from a Japanese Lowland Soil Cropped to Onion: III. Relationship with Soil Physical Properties

Nsalambi V. Nkongolo, Kanta Kuramochi and Hatano Ryusuke

We studied the spatial variability of soil physical properties and related these properties to N_2O emissions. The study was conducted in a Japanese lowland soil cropped to onion in Mikassa, Hokkaido (Japan). N_2O emissions measurements and soil sampling were conducted along a 100×100 m (1999) and 60×60 m (2000) grids with samples taken at 10 m spacing. Air samples for N_2O determination were collected using the closed-chamber technique. Air samples were stored in vial bottles for analysis with a gas chromatograph with electron capture detector within 24 h after sampling. Soil samples were collected with a 5 cm diameter and a 5 cm height cylinder. Soil physical properties measured were soil temperature (T), bulk density (ρb), volumetric water content (θ_v), gravimetric water content (θ_g), air-filled porosity (fa), total pore space (TPS), relative gas diffusivity coefficient (D_s/D_o) and the pore tortuosity factor (τ). Results showed that N_2O emissions were highest in 1999 as compared to 2000. They were fitted to a linear variogram in 1999 while they responded to a spherical variogram model in 2000. Positive first degree surface trends were also found in N_2O emissions data in both years and the removal of these trends did not change variogram models, but significantly improved them by increasing the R^2 and Q values. Soil physical properties responded to a range of variograms, from linear to spherical models. Detrending soil physical properties either increased (T) or decreased (θ_v) the range and R^2 values. Soil T, τ, D_s/D_o, WFPS were significantly correlated with N_2O emissions. N_2O emissions and soil properties varied considerably in space and time. More studies are needed to identify other soil physical properties which might better correlate with N_2O emissions, besides the traditional T and WFPS. (*International Journal of Agricultural Research 4 (1): 1-16, 2009;* ***doi:*** *10.3923/ijar.2009.1.16*)

Nitrous Oxide (N_2O) Emissions from a Japanese Lowland Soil Cropped to Onion: I. Spatial and Temporal Variability of Fluxes

Nsalambi V. Nkongolo, Kanta Kuramochi and Hatano Ryusuke

Field studies were conducted to assess the spatial and temporal variability of nitrous oxide (N_2O) emissions in an agricultural field cropped to onion in Mikassa, northern Hokkaido (Japan). N_2O emissions measurements were conducted in 100 by 100 m and 60 by 60 m grids in 1999 and 2000, respectively with samples taken at 10 m spacing. Air samples for N_2O determinations were collected using the closed-chamber technique. The chambers were circular with steel frames. The top of each chamber had a gas sampling tube and a bag to control air pressure inside. The height and diameter of the chamber were 0.35 and 0.30 m, respectively. Air samples were stored in vial bottles for analysis with a gas chromatograph with electron capture detector within 24 h after sampling. GS+ 7.0 geostatistical software and statistix 8.0 were used for data analysis. Results showed that N_2O emissions were highest in 1999 as compared to 2000. N_2O emissions were fitted to a linear variogram in 1999 and responded to a spherical variogram model in 2000. Positive first degree surface trends were also found for N_2O emissions data in both years. However, the removal of these trends did not change variogram models, but significantly improved them by increasing the R^2 and Q values. N_2O emissions systematically varied with small zones of uptake (negative flux) across the field, suggesting the presence of hot spots. (*International Journal of Agricultural Research 4 (1): 17-28, 2009;* ***doi:*** *10.3923/ijar.2009.17.28*)

Adoption of Integrated Soil Fertility and Nutrient Management Approach: Farmers' Preferences for Extension Teaching Methods in Bangladesh

M.G. Farouque and H. Takeya

The major purpose of the study was to determine the extent of preferences of different categories of farmers for effective extension teaching methods aimed at encouraging adoption of the Integrated Soil Fertility (ISF) and Nutrient Management (NM) approach. Data were collected from 120 farmers from eight villages in four districts in Bangladesh between December 2007 and January 2008. Of these farmers, 39 landless, 34 marginal, 19 small, 20 medium and 8 were large farmers. A four-point rating scale was used to analyze the preferences: strongly resist, mildly resist, mildly prefer and strongly prefer corresponded to

scores of 0, 1, 2 and 3, respectively. The majority of the landless, marginal and small farmers preferred individual extension teaching methods; on the other hand, the largest segment of medium and large farmers preferred group and mass extension teaching methods. Inadequate education, poor training and low income were the major reasons for the landless, marginal and small farmers' relatively higher preferences for individual teaching methods. The channel of transfer of crop production technology showed that extension service providers had very little involvement in pre-extension activities. Conversely, farmers and farmers' representatives played very little role in planning, implementing, evaluating and verification of trials undertaken by the extension department. Present different farmers' groups require different types of extension teaching methods in order to adopt the ISF and NM approach. (*International Journal of Agricultural Research 4 (1): 29-37, 2009;* ***doi:*** *10.3923/ijar.2009.29.37*)

Isolation and Characterization of A Novel *Glu-Bx* HMW-GS Allele from Tibet Bread Wheat Landrace

Zehong Yan, Shoufen Dai, Dengcai Liu, Yuming Wei, Jirui Wang and Youliang Zheng

A novel HMW-GS of Bx6** , with slightly slower migration rate than that of Bx7 presented in wheat cultivar Chinese Spring, was found in a Tibet bread wheat landrace using SDS-PAGE. The gene for this subunit was isolated and its sequence was obtained. This gene was very similar to Bx7 both in nucleotide and deduced amino acid sequence. At the nucleotide sequence level, Bx6** different from Bx7 by the deletion of an 18 bp fragment and three nucleotides replacement at position 455 A/G, 2046 G/A and 2208C/G, respectively. At the deduced amino acid sequence level, the only difference is that Bx6** shorter than Bx7 by the deletion of a hexaploid peptide unit (PGQGKQ). These results suggested that Bx6** was a derivation of Bx7 and was formed by replication slippage. (*International Journal of Agricultural Research 4 (1): 38-45, 2009;* ***doi:*** *10.3923/ijar.2009.38.45*)

Effects of Partial Rootzone and Controlled Deficit Irrigation on Growth, Yield and Peroxidase Activities of Tomatoes (*Lycopersicon esculentum* Mill.)

Mohd Razi Ismail and S. Phizackerley

The aim of the experiment was to examine the application of partial rootzone drying and deficit irrigation on growth and plant development of tomatoes. Potted

fresh market tomatoes (*Lycopersicon esculentum* Mill.) in pots were subjected to partial root zone drying (PRD) and controlled deficit irrigation (CDI) under glasshouse conditions. Roots of plants were remained attached to plants and half the volume divided in one plant and the other half planted in the other adjacent pot. The treatments were: well-watered continually maintained close to field capacity in both pots (control), CDI_{50} (half the amount of water in control divided equally to both pots with each watering), PRD_{50} (half the amount of water in control applied to one pot while water was withheld from the other pot until soil water declined to 50-70% the field capacity and then water was applied to the other pot), PRD_{25} (half the amount of water in control was applied to one pot while water was withheld from the other pots until soil moisture declined to 25-50% field capacity and then water was applied to the other pot) and CDI_{25} (quarter amount of water in control divided equally to both pots with each watering). Imposing water deficit reduced fruit yield up to 18% in PRD_{50} and 33% in CDI_{50} which coincided with an impairment of fruit expansion. The percentage of fruit dry matter and osmotic potential increased in both PRD and CDI compared with the control. The incidence of blossom end rot increased in both CDI and PRD_{25} compared with the control and PRD_{50} treatments. Cell wall peroxidase in the epidermal layer of fruit may have a role in cessation of fruit expansion towards fruit maturity under reduced water availability. (*International Journal of Agricultural Research 4 (1): 46-52, 2009;* ***doi:*** *10.3923/ijar.2009.46.52*)

Effects of Calcium and Chitosan Treatments on Controlling Anthracnose and Postharvest Quality of Papaya (*Carica papaya* L.)

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This study was conducted to evaluate the *in vitro* fungicidal effects of calcium and chitosan on *Colletotrichum gloeosporioides* and to as well determine their effects on storage life and quality of papaya. Potato Dextrose Agar (PDA) incorporated with calcium at different concentrations (1.5, 2.5 or 3.5%) or in combination with chitosan at 0.75% or chitosan alone were used as treatments for *in vitro* tests. Uncorporated treatments with PDA and untreated fruits as control used on papaya fruits for storage life and quality evolutions. Chitosan had the greatest effect against *Colletotrichum gloeosporioides* in both *in vitro* and in disease incidence (%) on papaya fruits compared to calcium treatment and as well as control. Calcium reduced spores germination significantly as calcium concentrations increased from 2.5 to 3.5%, compared to the 1.5% and control treatments. However, it did not

show any fungicidal effects on mycelial growth. The combination of 2.5% calcium with chitosan 0.75% completely inhibited spore germinations and significantly inhibited mycelia growth compared to calcium individual treatments and as well as control. Anthracnose disease incidence (%) was significantly controlled (5.6%) using calcium at 2.5% combined with chitosan compared with the other treatments. This demonstrated the best effect on controlling anthracnose disease incidence for papaya fruits. Moreover, this treatment proved able to extend the storage life of papaya fruits up to 33 days of storage life while maintaining valuable attributes of quality. (*International Journal of Agricultural Research 4 (2): 53-68, 2009;* ***doi:*** *10.3923/ijar.2009.53.68*)

Co-Composting of Empty Fruit Bunches and Partially Treated Palm Oil Mill Effluents in Pilot Scale

A.S. Baharuddin, M. Wakisaka, Y. Shirai, S. Abd-Aziz, N.A. Abdul Rahman and M.A. Hassan

The main objective of this study is to investigate the physicochemical changes of the co-composting Empty Fruit Bunch (EFB) with partially treated palm oil mill effluent (POME) in pilot scale. The partially treated POME from anaerobic pond was sprayed onto the shredded EFB throughout the treatment. The composting materials were turned over one to three times per week for aeration. Temperature and oxygen were monitored at different depths of the composting piles. Parameters such as C, N, pH, nutrients, heavy metals and total bacteria count were also determined. The temperature was increased up to 58.5°C at day three of treatment, after that fluctuated between 50 to 62°C and then decreased in the latter stage of the process. The pH of the system (7.75-8.10) did not vary significantly during the treatment period while moisture content was reduced from 65-75% to about 60% at the end of the treatment. The initial C/N ratio of 45 was significantly reduced to 12 after 60 days of composting. The final cured compost contained a considerable amount of nutrients (carbon, nitrogen, phosphorus, potassium, calcium, magnesium, sulfur and iron) and trace amounts of manganese, zinc, copper. In addition, very low levels of heavy metals were detected in the compost. The number of bacteria involved in the composting process was decreased at the end of the composting period. The results obtained indicated that pilot scale of co-composting EFB with partially treated POME gave acceptable quality of compost and ease in operation. The compost product may useful in palm oil plantation as fertilizer and soil amendment. (*International Journal of Agricultural Research 4 (2): 69-78, 2009;* ***doi:*** *10.3923/ijar.2009.69.78*)

Phosphate Solubilizing *Gluconacetobacter* sp., *Burkholderia* sp. and their Potential Interaction with Cowpea (*Vigna unguiculata* (L.) Walp.)

M.S. Linu, J. Stephen and M.S. Jisha

Eighty-one potential phosphate solubilizing bacteria isolated from rhizosphere soil were screened for their Mineral Phosphate Solubilizing (MPS) ability on Pikovskaya and National Botanical Research Institute's Phosphate (NBRIP) medium. The majority of the isolates exhibited a strong ability to solubilize hydroxyapatite in both liquid and solid media. The solubilization in liquid medium corresponded with a decrease in the pH of the medium. Two bacterial strains exhibiting high solubilization of Tricalcium Phosphate (TCP) in Pikovskaya liquid cultures were identified as *Gluconacetobacter* sp. and *Burkholderia* sp. on the basis of phenotypic features, whole cell Fatty Acid Methyl Ester (FAME) profiles, 16S rDNA typing and carbon Substrate Utilization (SU) using Biolog GN2 plates. Seed inoculation of cowpea by these novel phosphate solubilizers improved nodulation, root and shoot biomass, straw and grain yield and phosphorus and nitrogen uptake of the crop. The dehydrogenase, phosphatase and the available P contents of the soil were stimulated by the inoculation with the phosphate solubilizing bacteria. Among the bacterial strains best effect on yield was obtained with *Burkholderia* sp. (*International Journal of Agricultural Research 4 (2): 79-87, 2009;* ***doi:*** *10.3923/ijar.2009.79.87*)

Studying of Genetic Diversity in Satsuma (*Citrus unshiu*) Mandarin Utilizing Microsatellite Markers

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Genetic diversity of forty-four genotypes of Satsuma cultivars from Mazandaran was assessed using Simple Sequence Repeat (SSR) markers. SSR markers in different genotypes determined 2-5 alleles. The average of Polymorphic Information Content (PIC) in SSR markers were 0.88. Also, Principal Component Analysis (PCA) showed that SSR with four primary factors explained 80% of variations. Dendrograms showed that SSR markers could completely separate the Unshiu population. All the genotypes were grouped in 3 distinct clusters in cluster analysis. The control population, owari Genotypes were located in a separated cluster, while local Unshiu genotypes, unknown Unshiu, Wase and Wase derived genotypes were put together in another cluster. These results confirm the close relationship between local unshiu genotypes and Wase group or one of its similar varieties. (*International Journal of Agricultural Research 4 (2): 88-96, 2009;* ***doi:*** *10.3923/ijar.2009.88.96*)

Influence of NPK Fertilization on Productivity and Oil Yield of Goundnut *(Arachis hypogaea)* and Sunflower *(Helianthus annuus)* in Intercropping System under Irrigated Condition

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A field experiment has been conducted at garden lands (*Vertic ustochrept*) of Agricultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore during Kharif (June to October) season of 2004 to ascertain the optimum nutrient requirement for groundnut+sunflower intercropping system under irrigated conditions with replacement series to enhance the productivity of groundnut+sunflower inter cropping system. Groundnut was raised as main crop and sunflower was planted as intercrop with 3:1 ratio. There were ten treatments viz., control (T_1), 100% Recommended Dose of Fertilizers (RDF) to main and inter crops (T_2), 100% RDF to main crop+no fertilizer to intercrop (T_3), 100% RDF to main crop+100% RDF to intercrop (T_4), 100% RDF to main crop+50% RDF of intercrop (T_5), T_3+50% RDF to intercrop as basal+50% N to intercrop as top dress (T_6), T_3+50% N to intercrop as basal (T_7), T_3+100% PK of intercrop as basal+50% N as basal+50% N as top dress (T_8), pure crop of sunflower with RDF (T_9) and pure crop of groundnut with RDF (T_{10}) were tested in randomized block design with three replications. All the above fertilizer treatments were imposed based on the area. 100% RDF to groundnut (main crop)+100% RDF P and K to sunflower (intercrop)+50% of N basal and 50% of N as top dressing to sunflower increased yield attributes, yield and oil contents of groundnut and sunflower. So, 100% recommended doses of NPK fertilizer to groundnut+100 RDF PK to sunflower with 50% N as basal and 50% (T_8) as top dressing will be optimum to realize maximum yield under groundnut+sunflower intercropping system in irrigated conditions. (*International Journal of Agricultural Research 4 (2): 97-106, 2009;* ***doi:*** *10.3923/ijar.2009.97.106*)

Gas Chromatography-Mass Spectroscopy Analysis and Evaluate Cumin Seeds and Their Essential Oil as Growth Promoters of New Zeland White Rabbits

M.A. EL-Manylawi and Hanaa F.M. Ali

Present study was aimed to investigate the chemical composition of cumin seeds essential oil by using Gas Chromatography-Mass Spectroscopy (GC-MS), also evaluate the effect of cumin seeds at two levels (0.25 and 0.50%) and its essential oil at four levels (25, 50, 100 and 200 mg kg^{-1} b.wt.) on growing New Zealand White (NZW) rabbits performance. Furthermore, a change in blood

constituents was measured as indicators of metabolic enzymes. GC-MS data indicated that 28 constituents were identified, representing (91.37%) of the total amount of essential oil. Significant effects of cumin seeds and its essential oil on growing performance, digestibility and some metabolic enzymes functions were observed at some levels either from cumin seed or its essential oil. (*International Journal of Agricultural Research 4 (3): 107-115, 2009;* ***doi:*** *10.3923/ijar.2009.107.115*)

Impacts of Rate and Split Application of N Fertilizer on Sugarcane Quality

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Effect of nitrogen (N) rate and its split application (AP) on qualitative and quantitative characteristics of sugarcane (*Saccharum officinarum* L.) cultivar CP48-103 was investigated on a loamy soil texture from 2006 to 2008 in the Sugarcane Research Center of the Khuzestan Province, Iran. The experiment was arranged in split plot randomized complete block design with three replications consisted of three different rates of N (N_1 = 92, N_2 = 138, N_3 = 184 kg N ha^{-1}) as main plots and three different AP (AP_1 = 20-40-40%, AP_2 = 30-35-35%, AP_3 = 30-30-40%) as subplots. Twenty canes were randomly harvested from each plot and their quantitative and qualitative characteristics were determined. The results showed that both rate and split application of N fertilizer had no significant effect on sugarcane characteristics. The interactive effects of N application rate and AP on juice purity depicted applying 92 kg N ha^{-1} and AP of 30-30-40% gave the purest juice with 90%. The Nitrogen Use Efficiency (NUE) was significantly greater for N_1 with values of 1.39 and 0.13 t kg^{-1} N in Cane Yield (CY) and Sugar Yield (SY), respectively. The results showed that the highest cane and sugar yield was obtained with 92 kg N ha^{-1} and AP of 30-35-35%. (*International Journal of Agricultural Research 4 (3): 116-123, 2009;* ***doi:*** *10.3923/ijar.2009.116.123*)

The Influence of Temperature on Growth and Yield of Green Beans for Processing

F. Yoldas and D. Esiyok

This research was carried out between in 2004 and 2005 at Odemis Technical Training College of Ege University in Odemis, Izmir to investigate the effects of sowing dates and windbreak treatments on growth and yield of 4 varieties of processing bean (*Phaseolus vulgaris* vars. Amboto, Gina, Nassau and Volare).

Also, the heat summations (thermal time) were determined for all cultivars. The heat summations were calculated for different periods as (a) from emergence to harvest, (b) from emergence to beginning of flowering and (c) from beginning of flowering to harvest. The highest yield (12783.7 kg ha^{-1}) was obtained by early sowing in July. It was observed that delaying the sowing date decreased the yield (10926.7 kg) in 2005. Yields showed a decreasing tendency as sowing dates get closer to autumn. Amboto variety with windbreak gave the highest yields in both years as 12501.0 and 12413.8 kg ha^{-1}, respectively. 1552.6°C day in Gina and Nassau, 795.3°C day in Gina and 958.7°C day in Volare were calculated as the highest thermal times for a, b and c, respectively. (*International Journal of Agricultural Research 4 (3): 124-130, 2009;* ***doi:*** *10.3923/ijar.2009.124.130*)

Karyotype Studies on *Pseudoroegneria gracillima* and *P. kosaninii* (Poaceae: Triticeae)

Haiqing Yu, Chunbang Ding, Chun Zhang and Yonghong Zhou

In order to obtain more cytological data, the karyotypes of *Pseudoroegneria gracillima* and *P. kosaninii* were investigated. Root tips of *P. gracillima* and *P. kosaninii* were pretreated in an ice bath, fixed in a mixture of 95% ethanol: glacial acetic acid and treated in 1 M HCl at 60°C in a water bath. Somatic cells were stained in Schiff at room temperature and the meristematic portions of the root tips were squashed in 45% acetic acid. The results show that: (1) *P. gracillima* is diploid with two pairs of satellites and *P. kosaninii* is octoploid with three pairs of satellites. The karyotypes of diploid *P. gracillima* and octoploid *P. kosaninii* are first reported, (2) the karyotype formulas of *P. gracillima* and *P. kosaninii* are 2n = 2x = 14 = 12 m (2sat)+2sm (2sat) and 2n = 8x = 56 = 42 m (6sat)+12sm+2st, respectively and (3) the karyotype of *P. gracillima* is 1A type, while *P. kosaninii* is 2B type. This demonstrated that there are great variations between the karyotypes of *P. gracillima* and *P. kosaninii*. (*International Journal of Agricultural Research 4 (3): 131-136, 2009;* ***doi:*** *10.3923/ijar.2009.131.136*)

Sex Pheromones of the Green Mirid, *Creontiades dilutus* (Stål) (Hemiptera: Miridae)

S.T. Lowor, A.P. Del Socorro and P.C. Gregg

Whole body extracts and air collections from *Creontiades dilutus* males and females were analyzed to identify the sex pheromone components. The major

component, hexyl hexanoate was found in whole body extracts and air collections from both sexes, while the minor component, (*E*)-2-hexenyl hexanoate, was only present in the female air collections. Field trapping experiments were conducted to determine the attractiveness of either of the single components and various binary blends to males. The optimum blend that consistently caught males in pheromone traps was a 5:1 ratio of hexyl hexanoate and (*E*)-2-hexenyl hexanoate. Trapping studies also showed that green mirids came to pheromone traps only between 18:00 and 06:00 h, suggesting that they might be nocturnal rather than diurnal insects as previously thought. (*International Journal of Agricultural Research 4 (4): 137-145, 2009;* ***doi:*** *10.3923/ijar.2009.137.145*)

Soil Degradation under Culture of Palm Oil Tree in the South of Ivory Cost

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In order to measure the impact of planting on the ground, the present study was undertaken to evaluate the evolution of particle size, chemical and physicochemical properties of soil during two consecutive cycles of cultivation of palm oil trees. The condition of soil under palm grove was compared to a control taken under natural forest. After 25 years of growing in the second generation, soil samples were collected in two areas. Samples were taken: one in the 0-20 cm layer and the other in the in the 40-60 cm layer. All samples were analyzed in a soil science laboratory. The results revealed a degradation of the physical, chemical and physicochemical characteristics of the soil. Planting palm oil trees resulted in the impoverishment of the soil in fine elements and a decline of the content in easily absorbed phosphorous. The cation exchange capacity and the content in organic matter was reduced while the content of exchangeable aluminum quadrupled. (*International Journal of Agricultural Research 4 (4): 146-152, 2009;* ***doi:*** *10.3923/ijar.2009.146.152*)

Potential for Pheromone Based Attract-and-Kill and Mating Disruption of the Green Mirid, *Creontiades dilutus* (Stål) (Hemiptera: Miridae)

S.T. Lowor, P.C. Gregg and A.P. Del Socorro

Attempts were made at applying green mirid pheromones in a sprayable formulation for mating disruption and attract-and-kill in *Creontiades dilutus* (Stål),

an emerging significant pest of cotton and other crops in Australia. In the mating disruption trials, a total trap shutdown for 2 days was observed. The short trap shutdown period is thought to have arisen from the formulation used. In the attract-and-kill work, efforts made to locate and count dead mirids for quantification did not work. Either the insecticide did not kill the mirids fast enough, resulting in their moving away from the treated row before dying, or the low numbers of mirids present made the sampling method ineffective. However, the trap results suggest that attract-and-kill for male green mirids remains a promising option. As with mating disruption, however, further work needs to be done on a long lasting formulation to overcome potential problems with reinvasion of treated fields. (*International Journal of Agricultural Research 4 (4): 153-162, 2009; **doi:** 10.3923/ijar.2009.153.162*)

Start-Up of Biohydrogen Production from Palm Oil Mill Effluent under Non-Sterile Condition in 50 L Continuous Stirred Tank Reactor

M.Z.M. Yusoff, M.A. Hassan, S. Abd-Aziz and N.A.A. Rahman

Feasibility study of biohydrogen production from Palm Oil Mill Effluent (POME) using POME sludge as a mixed culture of natural inoculum was conducted. The experiment was done using a 150 mL serum bottle and 50 L Continuous Stirred Tank Reactor (CSTR) in batch and continuous modes, respectively. The biogas produced from both fermentations was free from methane due to heat treatment of the sludge prior to inoculation. The results obtained showed that the biohydrogen content in 150 mL serum bottle was higher (70%) than that of 50 L CSTR (25%). The biohydrogen rates for serum bottle and 50 L bioreactor were 74 and 33 NmL/h/L, respectively. Butyrate, propionate and acetate were the main soluble metabolites produced during the fermentation and reduced the pH of broth. (*International Journal of Agricultural Research 4 (4): 163-168, 2009; **doi:** 10.3923/ijar.2009.163.168*)

Physiological and Biochemical Evaluation of Rice Seed Storability with Different Seed Coating Techniques

P. Thobunluepop, W. Chitbanchong, E. Pawelzik and S. Vearasilp

The effect of pre-sowing seed treatments in direct-seeding rice production system on the germination, seedling vigor of rice cv. KDML 105 was evaluated through investigating the biochemical changes during storage following seed coating

techniques. The seeds were coated by traditional fungicide (captan; CA), biological fungicide polymers [chitosan-lignosulphonate polymer (CL) and eugenol incoporated into chitosan-lignosulphonate polymer (E+CL)] and un-coated seeds as control (CO). CA significantly affected the rice seed storability and the associated biochemical deterioration. After 12 months storage, seed moisture content and seed water activity increased that affected the germination rate and spread, seedling vigor; seedling dry weight, shoot and root length, seedling growth rate and susceptible to stress conditions. The loss of viability is associated with disturbances of the cell membranes, the loss of enzymes; α-amylase, ascorbate peroxidase APX and superoxide dismutase SOD activity, sugars and lipid content accompanied by increased free fatty acid FFA and activated lipoxygenase enzyme LOX. CL and E+CL performed the best of seed vigor, because they could maintain the antioxidative scavenging enzymes are APX and SOD and a high antioxidant activity. In addition, α-amylase activity and sugar content increased which was positive correlated with seed germination and vigor. These improvements were attributed to maintain the nutritive reserve and dehydrogenase activity in seeds. Moreover, the biological seed treatments stimulated the embryo growth and so speeding up the seedling emergence. (*International Journal of Agricultural Research 4 (5): 169-184, 2009;* ***doi:*** *10.3923/ijar.2009.169.184*)

Effect of Palm Oil Mill Effluent Supplementation on Cellulase Production from Rice Straw by Local Fungal Isolates

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In this study, Palm Oil Mill Effluent (POME) was selected as supplement in rice straw fermentation to replace commercial inducer due to its high concentration of simple carbohydrate and nitrogenous compounds. The cellulase activity of the enzyme produced were then determined individually and combined (enzyme cocktail) to observe increment in cellulase activity. Individually, filter paperase (FPAse), carboxymethyl cellulase (CMCase) and β-glucosidase activities increase for all 3 fungi used except FPAse for *Aspergillus* sp. (NEW). Highest FPAse and CMCase activities increment observed was from *Phanerochaete chrysosporium* which were 72 and 236% increment, respectively, while highest β-glucosidase activity was from *Aspergillus terreus* (AT) which was 298% increment. Meanwhile in cocktail cellulase, synergistic effect was observed especially for FPAse activity whereby highest FPAse activity observed was by cocktail of all the three species of fungi which show 393% increment. Though CMCase increment was observed in this mode, it was not as high as FPAse where the highest CMCase activity observed was cocktail by the three fungal species which

increased by 41%. However, in β-glucosidase activity, only cocktail of NEW and AT showed increment from their average activity which was by 6%. It seems that β-glucosidase activity plays major role in determining the total cellulase activity. In the nutshell, supplementation of POME can improve cellulase activity. (*International Journal of Agricultural Research 4 (5): 185-192, 2009;* ***doi:*** *10.3923/ijar.2009.185.192*)

Effect of Different Levels of Nitrogen and Phosphorus Fertilizers on the Growth and Yield of Maize (*Zea mays* L.) in Southwest Nigeria

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An experiment to determine the effects of different levels of nitrogen and phosphorus fertilizers on the growth and yield of maize was conducted between June and October, 2007 at the Teaching and Research Farm of the Federal University of Technology, Akure. The experiment was laid out in a Randomized Complete Block Design (RCBD) consisting of twelve treatments with three replicates. The treatments were, 0 kg N ha^{-1} + 0 kg P ha^{-1} (T_1), 60 kg N ha^{-1} + 0 kg P ha^{-1} (T_2), 120 kg N ha^{-1} + 0 kg P ha^{-1} (T_3), 0 kg N ha^{-1} + 20 kg P ha^{-1} (T_4), 0 kg N ha^{-1} + 40 kg P ha^{-1} (T_5), 0 kg N ha^{-1} + 60 kg P ha^{-1} (T_6), 60 kg N ha^{-1} + 20 kg P ha^{-1} (T_7), 60 kg N ha^{-1} + 40 kg P ha^{-1} (T_8), 60 kg N ha^{-1} + 60 kg P ha^{-1} (T_9), 120 kg N ha^{-1} + 20 kg P ha^{-1} (T_{10}), 120 kg N ha^{-1} + 40 kg P ha^{-1} (T_{11}) and 120 kg N ha^{-1} + 60 kg P ha^{-1} (T_{12}). The result of the study showed that application of 120 kg N ha^{-1} + 0 kg P ha^{-1} and 60 kg N ha^{-1} + 40 kg P ha^{-1} significantly increased the growth of maize than other treatments. The application rate of 120 kg N ha^{-1} +40 kg P ha^{-1} significantly ($p = 0.05$) enhanced grain yield. The study therefore suggests that, for optimum grain yield, 120 kg N ha^{-1} + 40 kg P ha^{-1} should be applied particularly in the study area and its environment. (*International Journal of Agricultural Research 4 (6): 193-203, 2009;* ***doi:*** *10.3923/ijar.2009.193.203*)

Rye Green Manure along with Nitrogen Fertilizer Application Increases Wheat (*Triticum aestivum* L.) Production under Dryland Condition

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The effects of rye green manure application along with different levels of nitrogen fertilizer on wheat production was investigated under rainfed dryland condition.

This study was carried out with or without rye green manure along with 4 nitrogen fertilization treatments (0, 26, 103 and 337 kg N ha^{-1}) in 3 rotation system (green manure-wheat) between 1999-2007 years. Results showed that the effects of green manure application with different amount of N fertilizers on wheat production tended to be significant. A maximum grain yield (2484 kg ha^{-1}) was obtained by application of rye green manure along with 26 kg N ha^{-1} and minimum yield (1757 kg ha^{-1}) from rye green manure without nitrogen application. Furthermore, crop morphophysiological characteristics including harvest index, spike length, number of spikes per square meter, number of tillers and thousand kernel weight (TKW) in plant tended to increase compared with check (green manure without N). It can be concluded that, application of green manure with nitrogen could indirectly increase Sardari yield by increasing yield components such as TKW and number of spikes per square meter. (*International Journal of Agricultural Research 4 (6): 204-212, 2009;* ***doi:*** *10.3923/ijar.2009.204.212*)

Effect of Nitrogen Rates on Dry Matter Remobilization of Three Rice Cultivars

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The aim of this study was to evaluate the effects of nitrogen fertilizer rates on dry matter remobilization among three rice cultivars. A field study was carried out at Ramin Agricultural and Natural Resources University. In 2007, a split plot experiment in the basis of randomized complete block design with three replications was used. Four nitrogen fertilizer rates (0, 100, 135 and 170 kg ha^{-1} from urea source) as the main plots and three rice cultivars (Champa, Anburi and LD183) as the sub plots were used. Results showed that nitrogen fertilizer rates had significant effect on dry matter remobilization amount in total shoot, stem and leaves in which among cultivars, LD183 had the highest amounts in terms of stem and total shoot dry matter remobilization. This amount was obtained at 0 kg ha^{-1} nitrogen fertilizer treatment. The highest rate of dry matter remobilization in leaves (except flag leaf) related to LD183 that obtained in 170 kg ha^{-1} nitrogen fertilizer level. Also, flag leaf of LD183 had the highest dry matter remobilization amount, although was not affected by nitrogen fertilizer rate. Thus, it seems that this part has important role in current photosynthesis at post anthesis stage compared with dry matter remobilization. According to our findings, flag leaf in Champa not only has no significant role in dry matter remobilization, but also act as a powerful sink for photosynthetic assimilates. (*International Journal of Agricultural Research 4 (6): 213-217, 2009;* ***doi:*** *10.3923/ijar.2009.213.217*)

Optimisation of Cryopreservation Technique in *Mokara* Golden Nugget Orchid Using PVS2 Vitrification

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The study was conducted to evaluate the effects of various sucrose concentrations on *Mokara* orchid shoots (0.5-1.0 and 1.0-1.5 cm) after precultured at 24 and 48 h. The 1.0-1.5 cm of *Mokara* shoots preculture at 0.25 M sucrose for 48 h was the best condition based on TTC assay and subsequently used for the following PVS2 vitrification treatment. The selected *Mokara* orchid shoots were subjected to PVS2 treatment at different time of exposure (min) and temperatures (0 and 24°C). The results showed that viability of shoots reached the highest absorbance value at 10 min and 24°C. However, for the overall treatment with the results shown that 0°C temperature treatment gave the higher absorbance value which could reduce the injurious effects of PVS2. For chlorophyll determination, cryopreservation of shoots at 0°C without LN (LN-) for 5 min exposure to PVS2 recorded as highest chlorophyll content. The result also shows that total chlorophyll a for shoot in all treatment were higher than chlorophyll b. (*International Journal of Agricultural Research 4 (7): 218-227, 2009;* ***doi:*** *10.3923/ijar.2009.218.227*)

Role of Biologically Active Amino Acid Formulations on Quality and Crop Productivity of Tea (*Camellia* sp.)

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Present study deals with foliar application of active amino acids based commercial formulations with particular reference to physiological attributes and their synergism with crop productivity. Application of Aminolforte resulted in momentous improvement in stomatal conductance and SPAD values while it reduced the diffusion resistance. Identical results were obtained in Humiforte 20, Fosnutren 20R and Kadostim 20 with varying degree of responses. Biochemical analysis revealed a significant increase in the content of total polyphenols and amino acids due to application of increasing concentrations of Aminolforte 20. Even though catechins increased marginally with application of Fosnutren 20R, positive improvement in the amino acid content was also noticed. Quality attributes like theaflavins, thearubigins, total liquor colour, colour index, briskness index and caffeine of made tea samples had a significant improvement in response to the foliar application. Significant improvement in productivity, physiological attributes, biochemical constituents, quality parameters of the tea was evident with reference

to the foliar application of bioformulations. Responses of the individual active amino acid formulations are presented and discussed in detail. (*International Journal of Agricultural Research 4 (7): 228-236, 2009;* ***doi:*** *10.3923/ijar.2009.228.236*)

Identification and Characterization of HMW Glutenin Subunits and their Coding Sequences in Dwarfing Polish Wheat

Xing Fan, Zi-Jian Song, Hou-Yang Kang, Rui-Wu Yang and Yong-Hong Zhou

To evaluate High Molecular Weight (HMW) glutenin subunit comparison in *Triticum turgidum* sp. *polonicum*, HMW glutenin subunits of 22 accessions were analyzed using SDS-PAGE. The result showed that the variation in the number of HMW glutenin subunits in this taxon ranged from 1-3. A dwarfing accession of *T. turgidum* sp. *polonicum* (dwarfing polish wheat) from Xingjiang in China has two putative expressed HMW glutenin subunits. Three complete coding region sequences of HMW glutenin subunit genes were amplified from dwarfing polish wheat using PCR method. The PCR products were derived from 1Ax (1*Ax-dp*), 1Bx gene (1*Bx-dp*) and a silent 1Ay (1*Ay-dp*) gene. The complete ORF of x-type HMW glutenin genes, 1*Ax-dp* and 1*Bx-dp*, were 2508 and 2385 bp in size, encoding 836 and 795 amino acids, respectively. The silent 1*Ay-dp* gene contained an in-frame internal stop codon and was 1806 bp in size. Sequence comparison indicated that they had primary structure identical to the published HMW glutenin subunits. Phylogenetic analysis suggested that 1*Ax-dp* from dwarfing polish wheat was most closely related to 1Ax1 and 1Ax2* from *Triticum aestivum*, while 1*Bx-dp* from dwarfing polish wheat was most closely related to 1Bx7 from *Triticum aestivum*. Based on sequence comparison, SDS-PAGE and phylogenetic analysis, it can be deduced that 1*Ax-dp* and 1*Bx-dp* are additional alleles at the *Glu-A1* and *Glu-B1* loci, respectively. (*International Journal of Agricultural Research 4 (8): 237-249, 2009;* ***doi:*** *10.3923/ijar.2009.237.249*)

Delignification of Oil Palm Empty Fruit Bunch using Chemical and Microbial Pretreatment Methods

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In this study, Oil Palm Empty Fruit Bunch (OPEFB) were subjected to chemical and microbial pretreatment for bioconversion of lignocellulosic biomass to

fermentable sugars. For chemical pretreatment, 2% (w/v) sodium hydroxide (NaOH) was been used for delignification while for microbial pretreatment, *Phanerochaete chrysosporium* ATCC 32629 was used as model microorganism by liquid and solid state culture techniques. Microbial pretreatment showed significant lignin removal with longer delignification time as compared to chemical pretreatment. For the same value of Klason lignin, delignification by chemical pretreatment need only 3 h as compared to 7 days for microbial pretreatment. The optimum value of Klason lignin for microbial pretreatment and chemical pretreatment were 5.89 and 5.93, respectively. In conclusion, delignification of OPEFB can be achieved via chemical and microbial pretreatment. (*International Journal of Agricultural Research 4 (8): 250-256, 2009;* ***doi:*** *10.3923/ijar.2009.250.256*)

Efficacy of Boron Spraying on Growth and Some External Qualities of Lettuce

B. Chutichudet and P. Chutichudet

A study to evaluate boron, in terms of borax ($B_4O.2Na.10H_2O$) or boric (H_3BO_3) by foliar spraying, on growth and external qualities was conducted on lettuce var. Grand Rapids under field conditions. A Factorial in Completely Randomized Design was arranged with four replications and composed of two factors; two types of boron (borax or boric) with four concentration rates (0, 0.0625, 0.125 or 0.1875%). The results showed that plants-treated with 0.0625% boric had the maximal plant height and bush size. While two types of boron at any concentration had no effect to biomass, chlorophyll content and the leaf colour. Furthermore, plants treated with 0.0625% boric experienced the lowest browning appearance at harvesting stage. (*International Journal of Agricultural Research 4 (9): 257-269, 2009;* ***doi:*** *10.3923/ijar.2009.257.269*)

Differences in Salt Tolerance Between *Phaseolus vulgaris* and *Phaseolus coccineus* Cultivars

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Diverse cultivars of *Phaseolus vulgaris* L. and *Phaseolus coccineus* L. were tested under saline conditions to evaluate yield performance and to estimate physiological differences (chlorophyll, stomatal conductance and transpiration rate). The study was carried out in Central Mexico in a low saline soil (pH 6.8-7.5 and EC of 2-5 dS m^{-1}) and high saline soil (pH 8-8.7 and EC of

5-8 dS m^{-1}). Three *P. vulgaris* cultivars and one *P. coccineus* cultivar were planted in a high saline soil during 2003, while thirteen *P. vulgaris* cultivars and three *P. coccineus* cultivars were planted in a low saline soil during 2004. The experimental design for both saline fields was a randomized complete block with four replicates. The *P. vulgaris* cv. Bayomex showed the highest seed yield, biomass and pod number under high saline conditions, while the *P. coccineus* cv. Ayocote Negro showed a lower seed yield and biomass, but higher seed weight. Canario-107 and Criollo were the *P. vulgaris* cultivars with the lowest yield during 2003. For the season 2004 under low saline conditions, four *P. vulgaris* cultivars (Zacatecas, Ojo de Cabra, Morito and Bayo-18) showed higher seed yield, biomass and seed weight, but the three *P. coccineus* cultivars showed major yield in all parameters. Generally, the cultivars of both crop species with high yield presented high chlorophyll levels than the sensitive cultivars under low and high saline conditions. In low salinity, the *P. coccineus* and *P. vulgaris* cultivars showed diversity in leaf stomatal conductance, transpiration rate and leaf temperature. Stomatal conductance explained yield differences among cultivars of both crop species showing two well defined groups (one for each crop species). (*International Journal of Agricultural Research 4 (9): 270-278, 2009;* ***doi:*** *10.3923/ijar.2009.270.278*)