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Novel Research and New Significant Tools for Plant Science Research

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"The population of the world will grow faster than out ability to produce adequate amounts of food, leading to mass starvation;" Thomas Malthus, 1798. Malthus, an Economist, lacked the appreciation for the ability of agriculture to use science and technology to dramatically increase plant and animal productivity. From the initial discovery of "corn" in Central Mexico yielding less than 100 kg/ha, to the plant we know today that yields up to 16,000 kg/ha, many agricultural commodities have shown similar yield expansions. Some are concerned "biotechnology" will create plant and animal "monsters," similar to discussions in the 1950's when corn was hybridized. Increased animal yields have undergone their own dramatic increases in productivity, from dairy cows yielding 2,000 kg milk/ lactation, to 12,000 kg. To further increase productivity, newer tools must be used that also decrease potential environmental problems. In the US, the GDP from plants and animals are roughly equal, but livestock use the majority of plant products, corn, soybeans, and hay, three of the four largest commodities. Beef cattle, the largest animal commodity, will see improvements in efficiency from plants that are more digestible, fiber components more rapidly digestible, and animals more energetically efficient. However, demand for well-marbled beef results in diets high in starch/ grain, as beef marbling is primarily comprised of "oleic fatty acid" that has starch as its precursor. Plant modifications will continue to improve economics of forage production, by such innovative improvements as more grasses available with the "brown midrib gene," legumes that have "super nodules" allowing plants to fix 400 kg/ha of N for increased legume plant yields, and to develop grasses, like corn and many others, that can fix 200 – 400 kg/ha of N without the need for commercial N. Developing N-fixing grasses would dramatically increase animal productivity in developing countries.

Biography

C. Pat Bagley is Professor and Director of the Beef Research Center with Southern University, Baton Rouge, LA. He received his Ph. D. from Virginia Tech University in 1978, and a B.S. (1973) and M.S. (Louisiana State University, 1975). His research areas have been focused on the efficient production of beef cattle using improved forage quality, biochars, feed byproducts in beef cattle diets, producing finished beef on primarily forage diets, and using electronic devices to track cattle movement patterns, mineral, and feed consumption. . He is the author/ coauthor of over 600 publications, has been Chairman of Regional, National and International Scientific societies. He has made professional presentations in 10 foreign countries.

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Opportunities and Challenges Farmer's Experiences Using Indigenous Knowledge to Adapt to Climate Change in Suitainable Development in Mekong Delta, Vietnam

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This research was carried out to explore the role of the appropriateness of farmer's indigenous knowledge and their adaptive capacity to climate change in An Giang province. KAP (Knowledge-Attitude-Practice), PRA (KIP and focus group discussion) and household survey have been applied to collect data. The results showed that local people used several effective indigenous knowledge's for coping with floods. However, the valuable indigenous knowledge has not been recorded yet, nor documented in written materials for sharing to young generation and communities; some indigenous practices are not suitable with the current requirement for flood adaptation strategies. Besides, this research explored the role and contribution of opportunities and challenges farmer's experiences using indigenous knowledge to adapt to floods in sustainable development in Mekong Delta, Vietnam

Keywords: Climate change, indigenous knowledge, flood, adaptation.

Biography

Dr. Pham Xuan Phu is currently lecturer and researcher of Rural Development and Natural Resources Management Department, Faculty of Agriculture and Natural Resources, An Giang University, a member of Ho Chi Minh City National University, Viet Nam. He has more than sixteen years' experience in teaching in researching. He has strong background in the fields of integrated rural development and agriculture. He has published several papers in international journal and local newspapers. My research is interesting about indigenous knowledge, vulnerable livelihoods,farming systems, migration, agro-ecosytems, social learning on indigenous knowledge farmers adaptive capacity, social resilience to flooding, adatation to climate change. Besides, he performs as livelihood and climate change policy advisor for Oxfam, VRN, Green IDEA, RDViet and WARECOD to undertake research and development activities in the fields of livelihood, natural resources management , water, energy and climate resilience components.

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Bio-chemical analysis for resistance to Alternaria alternata early blight disease in potato Solanum tuberosum

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Early blight disease of potato, caused by the potato pathotype Alternaria alternata (Fr.) Keissler (AA), is one of the most serious fungal diseases to affect potatoes globally. To develop an understanding of how potatoes respond to AA potato pathotype infection, we examined the host transcript accumulation over the period of a week post AA inoculation on three resistant and three susceptible potato genotypes, using marker genes, PR-2, ChtA, PR-5, PR1-b, PIN2, ERF3, PAL and LOX and enzymes activity, catalase (CAT), superoxide dismutase (SOD), peroxidase (POX), polyphenol oxidase (PPOs) and phenylalanine ammonia-lyase (PAL) analysis. The results indicated expression of PR-2, ChtA, PR-5, PR1-b and PAL genes by qPCR was significantly increased up to 8.61 fold in inoculated resistant genotypes to susceptible and controls, not inoculated potato genotypes. Transcription levels of PIN2, ERF3 and LOX genes were significantly decreased in resistant inoculated potato plants. Activities of POX, SOD and PPOs enzymes were also significantly increased up to 7.40 fold in inoculated resistant potato genotypes, 10/33/R1, 3/33/R2 and 21/33/R2 compared to susceptible and controls. CAT enzyme in 21/33/R2 genotype, and PAL enzyme activity in resistant 21/33/R2 and 10/33/R1genotypes, showed a significant increase by 3.3 fold in susceptible and control plants. Biomass growth factors (BGPs) showed a decreasing trend in inoculated samples compared to control genotypes. The knowledge obtained from changes in gene expression levels and enzyme production in defense processes in infected potato plants can inform future studies to identify the defense mechanism and generate resistant potato cultivars.

Keywords: Alternaria alternata, Antioxidant enzymes, biomass, defense mechanism, qPCR, Solanum tuberosum.

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Transcriptional Profiling of Rice to Nitrogen Deficiency Stress

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Nitrogen (N) is an essential nutrient for rice plant growth and development. However, studies have shown that N deficiency has been one of the factors affecting rice crop productivity worldwide. The present study analysed the differential expression of 12 transcription factors (TFs) related to brown planthopper (BPH) resistance in response to different levels of N stress (1.04 mM NH4NO3, 0.64 mM NH4NO3 and 0.24 mM NH4NO3) in two rice cultivars the TN1(susceptible to BPH) and IR70 (resistant to BPH). Gene expression profiling revealed that the TF genes were more responsive to N stress in IR70 compared to TN1. All TFs exhibited the highest level of expression under the lowest N level (0.24 mM NH4NO3) in both the TN1 and IR70 rice cultivars. Among the TFs investigated, all 12 TFs were up-regulated in IR70 whilst 10 TFs were up-regulated in the TN1 in response to the reduced N levels compared to the optimal N levels (1.44 mM NH4NO3). OsNC1 and OsNCL2 were down-regulated in the TN1 in response to N stress which indicated that both the genes might not be responsive to N stress in this rice cultivar. This study identified 5 TFS which exhibited the highest level of expression in IR70. Our findings highlighted that the TFs which have been linked to resistance to BPH were potentially responsive to N stress in the IR70. The differential expression of these genes in the TN1 and IR70 provided new avenues for further understanding the needs for developing rice cultivars with improved N stress tolerance.

Keywords: rice, nitrogen, transcription factors, up-regulation, down-regulation.

Biography

Dr Uma Priya is currently the Section Head of the Food Microbiology Laboratory with the Department of Chemistry Malaysia, a government agency under the Ministry of Science, Technology and Innovation Malaysia. She has more than 15 years of experience in food and water microbiology testing. She also has experience of running an internationally accredited laboratory with an additional stint of 2 years in the DNA Forensic Laboratory and was responsible for human DNA testing for regulatory matters. Dr Uma holds a PhD in Plant Molecular Biotechnology from Newcastle University, United Kingdom. She obtained her Masters in Environmental Management and Bachelors in Microbiology from the National University of Malaysia (UKM).

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Evaluation of the growth and quality of lettuce microgreens (Lactuca sativa L.) in the hydroponic system: A review

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Lettuce (Lactuca sativa L.) is one of the most popular vegetables, used especially in salads, consumed in ever increasing quantities as it is perceived as „healthier foods". The parts most often used are leaves, but stems or seeds can also be used. Lettuce is cultivated for its head, which is usually consumed fresh, as different salads, and during the last years as microgreens (cotyledon phase). During this growing phase plants can be four up to 40 times more concentrated in beneficial nutrients, vitamins and minerals. Lettuce microgreens can provide higher amounts of phytonutrients (ascorbic acid, -carotene, -tocopherol, and phylloquinone) and minerals (Ca, Mg, Fe, Mn, Zn, Se, and Mo), compared with their mature-leaf counterparts. Lettuce has a high ecological plasticity, but, in spite of this, its phenotypic expression, morphology, physiology and anatomy are significantly influenced by environment conditions. The environment conditions which influence the development of lettuce microgreens in the hydroponic system are (average values): light (400 W), photoperiodicity (12 h), light intensity (500 µmol m-2 s-1), color spectrum (440-460 nm), temperature (20±2°C), humidity (80±5 %). Nutritional solution in the hydroponic system must be carefully monitored, by checking certain essential parameters such as (average values): pH (6.3±0.4), electrical conductivity (1.8±0.2 mS), dissolved oxygen (6mgL-1) and temperature (18±2°C). From the analysis of expert literature, it results the need to set up certain cultivating protocols of microgreens in a hydroponic system to eliminate as many factors which can influence negatively plants, in order to obtain higher concentrations of active substances.

Biography

Prof. dr. Rusu Teodor from University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, Romania, teach Agrotechnics, Experimental Techniques and Rural Development. Has worked as a soil pedologist for the 3 years, and agrotechnics for the last 25 years, specializing in soil monitoring, soil tillage, soil quality, minimum tillage, no-tillage, conservative agriculture, microgreens and climatic changes.

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Comparison of yield of Triticale genotypes in South Khorasan of Iran

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In this experiment, seven promising lines of the order include ET-85-4, ET-85-14, ET-85-15, ET-85-17, ET-84-17, ET-82-15 and ET-83-18. Which had shown their superiority during different experiments of previous research, compared to the control of Juanillo-92 in a randomized complete block design, with three replications in two regions of South Khorasan province. Traits such as number of days to spike emergence, number of days to physiological maturity, spike length, plant height, 1000-seed weight, peduncle length and grain yield were measured. Analysis of variance was performed using SAS software and mean comparison was performed based on Duncan's multiple range test. The results showed that the effect of genotype was significant on number of days to spike (at 1% level), number of days to physiological maturity and spike length (at 5% level) but had no significant effect on other traits. The two lines ET-82-15 and ET-85-17 had the highest spike length with averages of 12.48 and 12.43 cm, respectively, and ET-85-14 lines had the lowest spike length with an average of 11.30. Although no significant difference of grain yield was observed between the studied lines, but nevertheless, ET-83-18 line with an average yield of 6.29 tons/ha had the highest yield of 6.04%. The yield of Juanillo-92 cultivar was higher with an average yield of 5.91 tons/ha. The lowest grain yield with an average of 5.76 tons/ha was related to the ET-85-15 line. Therefore, ET-83-18 line is recommended in Birjand and similar areas and can replace with Juanillo-92 cultivar in these areas.

Keywords: Triticale, Farmers condition, Promising line, Yield.

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Low Light Stress Influences Resistant Starch Content and Glycemic Index of Rice (O. sativa L)

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Low light (LL) stress is an important abiotic stress of wet season which adversely affects starch biosynthesis and results in drastic reduction in rice grain yield. In general, the grain yield decreases together with reduction in the amylose (AC) and resistant starch (RS) contents while the glycemic index (GI) values increased in plants exposed to LL stress. This is the first report of the effect of LL stress on RS and GI values. In the present investigation, 14 rice genotypes are studied for the effect of LL stress on AC, RS, and GI of the grains. Rice genotypes, Purnendu and Shashi differ in exhibiting relatively much lower reduction in AC and RS and hence little change in their GI values under LL stress, while wide variation is observed for the rest of the genotypes. The grain yields of Purnendu and Shashi are also not much affected by the LL stress. There is a dramatic increase in the expression levels of the gbssI in the middle stage of grain development in the two genotypes (Purnendu and Mahisugandha with contrasting RS, AC, and GI). Maximum expression of the gene was observed in Purnendu at middle stage showing a positive correlation between RS and gbssI expression. As rice is grown mainly in wet season, the identification of rice genotypes which do not permit much change in RS value when grown under LL and hence no significant increase in the GI value, would help to develop better rice varieties for consumption by diabetics.

Biography

Darshan Panda has completed his PhD from Ravenshaw Univerity, Cuttack Odisha and currently working as a senior research fellow at ICAR-National rice research instutire, Odisha.

The impact of CO2 increase on plants secondary metabolites

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The concentrations of atmospheric CO2 have increased from 350–360 ppm in the 1990s to the current 419 ppm (in May 2021). The increasing CO2 concentration could be helpful for plants growing because it leads to an increase in the rate of photosynthetic carbon fixation, which causes an increase in biomass production. Even more, the plants have been suffering less from biotic stress as elevating carbon dioxide could prevent mold and fungi formation.

In the present study, we test different plant species from Brassicaceae family (*Brassica oleracea, variety capitate, Brassica oleracea, variety botrytis, Sinapis alba, Raphanus sativus, Brassica oleracea, variety italica*) grown at three carbon dioxide concentrations (400, 800, and 1200 ppmv) to test the influence of elevated carbon dioxide on volatile organic compounds emission, photosynthetic parameters, chlorophylls, and carotenoids. We have been shown that different plant species react specifically to increasing carbon dioxide, and their metabolic profiles are changing.

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UV-C Irradiation to Extend the Shelf Life of Cherry Tomato

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Tomatoes (Lycopersicon esculentum) are popular for consumption all over the world, but due to the fact that after harvesting, tomatoes change their internal composition leading to their deterioration, resulting in short shelf life. Therefore, the objective is to study the effect of UV-C irradiation on the quality of Cherry tomatoes. UV-C irradiation at 2 kJ m-2 and storage at 5° C for 28 days. After 28 days of storage, UV-C had a weight loss of 0.49%, which is more than control treatments (0.37%). UV-C irradiation was able to slow down the reduction of the firmness value of 5.3 N, which is greater than the control treatment (4.7 N). UV-C irradiation was able to delay the reduction of the firmness equal to 5.3 N, which is greater than the control treatment (4.7 N), stimulate the accumulation of vitamin C, the values were 33.2 and 31.6 mg / 100 g ml in UV-C treatment and control, respectively, stimulates the accumulation of antioxidant content (1.18-1.2 AAE / g FW), and stimulate the accumulation of flavonoid compounds 14.1 and 12.1 mg / 100 g FW in UV-C treatment and control, respectively. Including stimulating lycopene accumulation in cherry tomatoes was 5.16 while control treatment was 4.89 mg / 100 g FW of lycopene. UV-C irradiation is effective in maintaining the quality and extending the shelf life of cherry tomatoes.

Biography

Panumas Kotepong is currently working as a senior scientist at the Department of Agriculture,Thailand. He has received his Ph.D. on horticuture from Kasetsart University, Thailand and postdoctoral studies on plant biology from Lincoln University, New Zealand. He has authored several publications in various journals and books. His publications reflect his research interests in postharvest technology and plant biochemistry

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