UNDERGRADUATE RESEARCH FORUM-2017

FACULTY OF AGRICULTURE

ABSTRACTS

FACULTY OF AGRICULTURE

EASTERN UNIVERSITY, SRI LANKA

UNDERGRADUATE RESEARCH FORUM-2017
FACULTY OF AGRICULTURE
Eastern University, Sri Lanka

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CONTENTS

AGRICULTURAL BIOLOGY

AGRICULTURAL CHEMISTRY

AGRICULTURAL ECONOMICS

AGRICULTURAL ENGINEERING

ANIMAL SCIENCE

CROP SCIENCE

AGRICULTURAL BIOLOGY

IDENTIFICATION OF BIOTYPES OF BROWN PLANTHOPPER (*Nilaparvata lugens* Stal) IN THE BATTICALOA DISTRICT

U. L. D. P. R. GUNASINGHE

ABSTRACT

Brown Planthopper (BPH) is the most destructive pest especially in irrigated rice in Sri Lanka. It affects rice crop at all stages of plant growth. BPHs are considered as the main constraints limiting rice yields in tropical environments and it is acting as virus vector also. Bg-357 and Bg-366 are the rice varieties released by Department of Agriculture in the year 1997 and 2009 for economical cultivation, which were moderately resistant to BPH. Batticaloa is the one of major rice-growing districts in Sri Lanka. There are some problems related to rice production in the Batticaloa district, *viz.*, water scarcity, late cultivation and infestation of BPH. Mandur is the major rice-growing area in the Batticaloa district and in this area the damage from the BPH is very severe. This was mainly due to the late cultivation of rice. Because of the water scarcity, farmers go for late cultivation in the later part of the *Yala* season. Farmers in early-cultivated areas apply insecticides to control the problem of BPH and do not follow the recommended rate of application. The farmers also change the insecticide season to season, which may lead to the development of biotypes in BPH and resistant BPHs migrated towards the fields, which were cultivated at later part of season. In Mandur area most of farmers cultivated Bg-357, Bg-366 and Bg-94-1 rice varieties. Even though Bg-366 and Bg-357 are moderate resistant rice varieties, they were severely affected by BPH with 25-50% and 50-70% yield loss respectively in Mandur area. This may be due to the emergence of a virulent BPH population, which can be a new biotype capable of breaking the resistance of Bg-366 and Bg-357. In order to confirm the biotypes of BPH, the BPH samples were collected from the Rice Research Development Institute (RRDI), Batalagoda and Batticaloa district especially Mandur and Kokkadichcholai areas and undergone for the morphological and genetic characterization. The morphological study showed that there were differences between the BPH samples collected from the Mandur area and Batalagoda and Kokkadicholai areas. The BPH samples of Mandur area have nodes through the vein system, which was not observed in the Batalagoda and Kokkadichcholai areas. Polymerase Chain Reaction (PCR) amplifications were carried out using Microsatellite markers for each sample of BPH. As the analysis of PCR products of marker 7314 by gel electrophoresis did not show the polymorphism it was suggested to do further study up to DNA sequencing for all samples of BPH to observe the Polymorphism.

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ASSESSMENT OF NEWLY IMPROVED RICE VARIETIES FOR BROWN PLANTHOPPER (*Nilaparvata lugens*) RESISTANCE

K. P. A. P. Kumari

ABSTRACT

Among the major food crops, rice is the only one that is almost exclusively a human food. It constitutes half of the diet of more than 1.6 billion people. Rice in Sri Lanka has played an important role in the country's functioning and survival for centuries. Rice productivity is adversely impacted by numerous biotic and abiotic factors. Among them Brown Planthopper (BPH), *Nilaparvata lugens* is one of the serious rice pests in Sri Lanka. Several BPH outbreaks were reported in Sri Lanka. Recently, some areas of Batticaloa district were highly affected due to the BPH damage. A questionnaire survey was carried out in three selected areas (Mandur, Kokkadichoolei and Kaludavali) which were highly affected by BPH. Variety and seed rate were mainly considered in the questionnaire survey. Presently; Bg 94-1, Bg 300, Bg 357, Bg 366 and Bg 374 rice varieties are grown in the Batticaloa district. These varieties were already released and recommended as resistant and moderately resistant varieties to BPH. The most effective way of BPH management is considered as host plant resistance. The varieties which are resistant to BPH play a significant role in controlling BPH outbreaks in rice cultivation. Varietal resistance is the most economic, least complicated and environmentally friendly approach for the control of BPH. Various evaluation methods were developed to measure response to BPH in rice varieties. Among them a screening methodology has been developed and widely adopted throughout the world. The resistance to BPH of rice varieties might have been changed from the time the varieties have been released. Therefore, it is very important to evaluate the current status of these improved varieties for BPH resistance by screening test. This study was carried out to evaluate the nature of BPH resistance in newly improved rice varieties collected from rice research stations in Sri Lanka using standard seed box screening test.The screening test was conducted at the plant house at the Rice Research and Development Institute, Batalagoda according to the IRRI (International Rice Research Institute) standards. Bg 380 was used as a susceptible check variety and Ptb 33 was used as a resistant check for this test. The BPH population in Batalagoda was maintained in the BPH rearing cages. The available seeds of newly improved rice varieties were collected including Batalagoda, Bombuwala, Labuduuwa and Ambalantota. Rice varieties were established and two week age seedlings were introduced in the galvanized iron trays with hoppers. The plant damages were graded by using the Standard Evaluation System for Rice scale. BPH damage was done by scoring system which was developed by the International Rice Research Institute. According to the results, comparison of level of resistance between now and past released rice varieties was done. Some varieties shown significant difference in level of resistance for BPH damage. Among all the tested rice varieties Bg 379/2 was shown Resistant to Moderately resistant level (score 3 - < 3.5) for BPH screening. The selected rice varieties; H-4, H-7, H-10, Bg 745, Bg 38, Bg 407H, Bg 403, Bg 369, Bg 366, Bg 359,Bg 357, Bg 310, Bg 305, Bg 304, Bg 300, Ld 371, At 306, At 309, At 311, At 354, At 405, Bw 267-3 and Bw 453 were shown Moderately Resistant level (score 3.5 - < 5) for BPH screening. These varieties will be proposed for the areas which were highly affected by Brown Planthopper in Batticaloa district with the further testing.

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STUDY ON THE EFFICACY OF MANAGEMENT PRACTICE AGAINST CHILLI LEAF CURL COMPLEX

C. Mulin Minoka

ABSTRACT

Chilli is an important cash crop in Sri Lanka. Leaf curl complex is considered as the major constraint for the cultivation of chilli. Major reasons for Leaf Curl Complex are thrips and mite attacks and involvement of viruses transmitted by whitefly. Effective vector management is one of the way of eradicate the Leaf curl complex on chilli. The present study focused on identifying the effective management practices and resistant varieties of chilli towards the leaf curl incidences. A field study was conducted at the Agronomy farm of the Eastern University and Kaluthavallai in Batticaloa district during August 2017 to November 2017 to examine the yield response, leaf curl complex incidence percentage, presence of white fly and natural enemy population on chilli varieties against management practices. The different chilli varieties *viz*., MI2, PC1, Galkiriyagama, KA2, MICH3 recommended by the Department of Agriculture, Sri Lanka were selected for this study. Based on the questionnaire survey at Kaluthavallai, the cultivating varieties, cultivating seasons, farmers' management practices, chilli leaf curl complex incidences and the presence of pest and natural enemies were analyzed. The survey showed that the farmers at Kaluthavallai are highly adapted to the chemical pesticide management practices. Their chemical management practices positively impacted on vector population of chilli leaf curl virus and suppress the natural enemy population. The field study at the Agronomy Farm, Eastern University was carried out by the inclusion of ecofriendly management practices, namely cow urine, vermiwash,vermicompost and neem extract and one of the chemical insecticide, Abamactin which was highly used by Kaluthavallai farmers and untreated control against different chilli varieties, MI2, PC1, Galkiriyagama, KA2 and MICH3. Among the thirty treatments, cow urine treated to MICH3 variety (181g yield per plant) obtained as a best treatment followed by Abamactin treated MICH3 (176g yield per plant) variety than the other practices via neem leaf extract, vermiwash, vermicompost. The least yield was observed in untreated MI2 variety (19g yield per plant). The study revealed that cow urine management practices had maximum efficacy to manage leaf curl complex in the field. Because of the yield, complex incidence percentage, natural enemy and white fly population parameter data, that was concluded so. Interaction was also observed in the yield of chilli between the management practices and varieties. The study recommended the MICH3 with the application of cow urine for the management of chilli leaf curl complex in the Batticaloa district.

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INFLUENCE OF CHEMICAL AND NANO-NITROGEN FERTILIZERS ON THE GROWTH AND YIELD OF RICE (*Oryza sativa* L.) CULTIVAR "Bg 250"

R. M. Niwanthaka Namal Rathnayake

ABSTRACT

Fertilizers play an important role where the ancient chemical fertilizers are replaced with nano and bio-fertilizers with their efficiency and environment friendly nature. Primary use of adding Nano fertilizer is fast uptake of nutrients from the soil and giving better and quicker yield. The symbiotic exchange between soil and plant system is very efficient. A pot experiment was conducted at the Rice Research Station, Sammanthurai, Sri Lanka involving the use of NPK fertilizers and Nano-Nitrogen fertilizer to test the growth attributes and yield of rice cultivar 'Bg 250'. The experiment was laid out in the Randomized Complete Block Design with five treatments and four replications and experiment was conducted in plastic pots (25cm height and 40cm diameter). The seeds were wrapped with net cotton cloth and 3 days after germination, the uniform and healthy seedlings were transplanted in the plastic pots. Number of 10 seedlings were raised in each plastic pot. There were altogether 20 plastic pots. Five treatments viz; T_1 – Control (No fertilizer), T_2 – 100% recommended chemical fertilizer (Urea, TSP and MOP), T_3 – 75% Urea + 25% Nano- Nitrogen fertilizer, T_4 – 50% Urea + 50% of Nano- Nitrogen fertilizer and T_5 – 100% Nano-Nitrogen fertilizer were applied. The results revealed that there were significant ($p<0.05$) differences between treatments in the tested parameters. The application of 100% Nano-Nitrogen fertilizer has given the highest growth performance with regard to plant height (57.9cm), number of tillers plant^{-1} (6), flag-leaf length (68.6cm), plant dry weight (9.9g), chlorophyll contents (chlorophyll a - 1.7mgg^{-1}, b - 1.4 mgg^{-1} and total chlorophyll – 3.1mgg^{-}1), yield and yield components.With regarding to yield and yield components 100% Nano-Nitrogen fertilizer has given the highest performance in the measured parameters such as 1000 grain weight (26.6g), panicle length (20.6cm) and yield (2.8tonnesha^{-1}). Hence it could be indicated that Nano-Nitrogen could used as an alternative to urea in the cultivation of rice with reduced nitrogen pressure on the environment.

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EFFECTS OF CHEMICAL AND BIO-FERTILIZERS ON THE GROWTH AND YIELD OF SELECTED RICE (*Oryza sativa* L.) CULTIVAR

L. M. Rifnas

ABSTRACT

Excessive and improper usage of chemical fertilizers on rice leads to adverse effects on human and environment. It has become necessary for a suitable alternative source of fertilizer to replace the chemical fertilizer or to reduce the usage of chemical fertilizers in rice production. Bio-fertilizer is one of the alternative sources which consists of beneficial microorganisms to reduce harmful effects to human and environment through reducing the usage of chemical fertilizer. An experiment was conducted in the Rice Research Station, Department of Agriculture, Sammanthurai, Sri Lanka during the *'Yala'* 2017 to evaluate the possibility of replacing chemical fertilizers with bio-fertilizers. Rice cultivar 'Bg 250' was used for this study. This experiment was laid out in the Randomized Complete Block Design and consisted of five treatments and four replications. The treatments were T_1 - No fertilizer (Control), T_2 - 100% recommended dose of chemical fertilizer (Urea-225 $kgha^{-1}$, TSP-55 $kgha^{-1}$ and MOP-60 $kgha^{-1}$), T_3 - 50% chemical fertilizer (Urea-113 $kgha^{-1}$, TSP-28 $kgha^{-1}$ and MOP-30 $kgha^{-1}$) + 50% bio-fertilizer (250 $mlha^{-1}$), T_4 - 50% bio-fertilizer only (250 $mlha^{-1}$), T_5 - 100% bio-fertilizer only (500 $mlha^{-1}$). 'Gro Bio-fertilizer®' was used as the bio-fertilizer source, which consisted of *Azotobacter chrocooccum*, *Azospirillum bresilensis*, *Bacillus polimixa*, *Bacillus megaterium* and other *Bacillus* spp. in a liquid base medium. Rice cultivar 'Bg 250' was evaluated for selected growth and yield parameters. The results revealed that there were significant ($p<0.05$) differences between treatments in the measured parameters. Combined application of 50% chemical fertilizer and 50% bio-fertilizer showed the highest plant performance such as plant height (58.2 cm), leaf area (272 cm^2), plant dry weight (3.3 g), chlorophyll contents (chlorophyll a - 1.7 mgg^{-1}, chlorophyll b - 1.4 mgg^{-1}, total chlorophyll - 3.1 mgg^{-1}), flag leaf length (80.1 cm), yield and yield components. The application of 100% bio-fertilizer, combined application of chemical and bio-fertilizer and 100% chemical fertilizer showed the highest 1000 grain weight (25.2, 25 and 24.6 g) respectively. The application of bio-fertilizer has significantly ($p<0.05$) increased the yield of rice. The application of combination of 50% chemical and 50% bio-fertilizer has given the highest (2.5 t ha^{-1}) yield. Hence, it could be stated that bio-fertilizer combined with chemical fertilizer could be used as an alternative source in the production of rice with reduced hazardous effects on the environment.

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VARIETAL EVALUATION OF SELECTED GROUNDNUT (*Arachis hypogeae*.L) CULTIVARS FOR MOISTURE STRESS TOLERANCE

Sukanya Muthaiya

ABSTRACT

There is a need to utilize water efficiently and effectively because water availability is scarce in the dry zone of Sri Lanka. Groundnut is grown in the Batticaloa district to limited extent; the yield is highly susceptible to moisture stress especially during the '*Yala'* Season. This experiment was conducted at the Agronomy farm of the Eastern University, Sri Lanka. Studies were made to evaluate moisture stress tolerance of selected groundnut cultivars; 'Lanka jumbo', 'Tissa' and 'Indi' when the stress was imposed during the flowering stage and to determine the most suitable groundnut cultivar which can resist drought and produce substantial yield. This experiment was laid out in the Randomized Complete Block Design with six treatments and four replications and the treatments were arranged in 3 × 2 factorial manner. Moisture stress was imposed for the selected groundnut cultivars for a period of ten days during the flowering stage. The control plants were watered once in two days to field capacity. There were significant ($p<0.05$) differences between treatments in the measured physiological and growth attributes. The highest amounts of chlorophylls (a 0.98 mgg-1, b 0.79 mgg-1 and total chlorophyll 1.7 mgg-1) contents were observed in 'Indi' groundnut cultivar and the lowest amounts (chlorophylls a 0.47 mgg-1, b 0.36 mgg-1 and total chlorophyll 0.9 mgg-1) were recorded in 'Tissa' groundnut cultivar.Moisture stress significantly ($p<0.05$) reduced the Relative Water Contents (RWC) of all the tested groundnut cultivars. The highest RWC was noticed in 'Indi' cultivar where the lowest was obtained in 'Tissa'. Moisture stress significantly ($p<0.05$) reduced the Leaf Area Index (LAI) of all the tested cultivars. The highest LAI was observed in 'Indi' cultivar and the lowest was found in 'Tissa'. There were significant ($p<0.05$) differences between treatments in the 100 seed weight, shelling percentage and yield of selected groundnut cultivars. The highest 100 seed weight (24.6 g) was obtained in 'Indi' cultivar and the lowest (7.2 g) was found in 'Tissa' groundnut cultivar. 'Lanka Jumbo' showed the highest shelling percentage (62.4%) and the lowest (38.6%) was found in 'Tissa'. Moisture stress significantly ($p<0.05$) reduced the yield of all the tested groundnut cultivars. The highest yield (0.8 tonnesha-1) was obtained in 'Indi' groundnut cultivar and the lowest (0.3 t ha-1) was found in 'Tissa'. There were also significant ($p<0.05$) interaction between cultivars and moisture stress treatments in the 'chlorophyll a', total chlorophyll, RWC, shelling percentage, 100 seed weight and yield of the tested cultivars. However, no significant ($p>0.05$) interaction was observed in the plant dry weight, number of pods per plant and 'chlorophyll b' content. The highest yield obtained in 'Indi' groundnut cultivar under moisture stress condition would have been due to its inherent characteristic feature. Hence, considering the measured physiological and growth attributes, 'Indi' groundnut cultivar can resist drought better than the rest of the cultivars and could be suggested for cultivation in the drought prone soils of the Batticaloa district.

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EFFECTS OF SILICON SUPPLEMENTS ON CONTROL OF RICE GRAIN DISCOLORATION DISEASE

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ABSTRACT

Rice is the most important cereal crop in Sri Lanka. Grain discoloration is an emerging disease complex, reducing grain quality of rice crop. Grain discoloration control is, however, mainly focused on fungicide; their use is limited due to perceived environmental problem and health concern. Silicon application is known as encouraging eco friendly alternative to fungicide. Foliar application of silicon (Si) based formulations were evaluated to examine their effect on reducing grain discoloration disease and determine the best Silicon supplement among the three Si-based products tested. Identification of pathogen causing grain discoloration was also carried out in this study. Field trials were conducted at Rice Research and Development Institute (RRDI), Bathalagoda from May to September 2017. After planting, Si was applied as solution at the rate of 1 ml/L at tillering and early flowering stage. Fungicide and control (distilled water) were applied as treatments at early flowering stage. Treatments were arranged in a randomized complete block design with three replications. Incidence of plant infection, percentage of grain discoloration and empty seed percentage of rice were calculated at harvesting stage. Laboratory study was carried out to isolate the grain discoloration causing pathogen from the infected seeds by using Potato Dextrose Agar plate method at Pathology division, RRDI, Bathalagoda. Pure cultures of pathogens were obtained through sub culturing. They were identified according to macroscopic features of pure culture and spore morphology. Analysis of variance was performed for all parametric variables and Probit analysis was done for non-parametric variables using SAS 9.1 package. Incidence of plant infection and grain discoloration percentage were reduced by foliar application of silicon supplements as same as fungicide application. Among the Si-based formulations tested, Gainexa UPL gave the best result in controlling grain discoloration in rice. These silicon supplements could be used as alternatives to synthetic fungicide and could reduce the amount of fungicide needed during rice crop cultivation. *Curvularia* spp. was isolated from the infected rice seeds. *Curvularia lunata* and *Curvularia pallescence* were identified as probable causal organisms of grain discoloration disease in rice from the study.

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EFFICACY OF SELECTED INORGANIC SALTS ON THE CONTROL OF ANTHRACNOSE FUNGUS (*Colletotrichum musae*) IN BANANA VARIETY *KOLIKUTTU*

S. Sinthuja

ABSTRACT

Anthracnose is a major postharvest disease causing significant reduction in the quality and quantity of banana production both globally and in Sri Lanka. Use of non-fungicidal approaches for the control of postharvest pathogens has become an emerging trend due to environmental and health hazards caused by the application of fungicides. Experiments were conducted to evaluate selected inorganic salts which are generally regarded as safe (GRAS) compounds for the control of banana anthracnose. The banana variety *Kolikuttu* was used for this study. The experiment was laid out in the completely randomized design with eight treatments and three replications for *in vivo* investigation and five treatments and four replications for *in vitro* experiment. The potential of 1% (w/v) sodium bicarbonate, 1% (w/v) sodium carbonate, 1% (v/v) clorox solution (a.i. sodium hypochlorite), hot water treatment (50 °C, 3 min) alone and in combination with the above inorganic salts (1%) with the hot water (50 °C, 3 min) to control the incidence of anthracnose in banana variety *Kolikuttu* was investigated during the storage at room temperature (28–30 °C). Two sets of experiments were conducted *in vivo* as natural infestation and artificial inoculation. In each set of *in vivo* experiment, twenty four matured, unripe fruits were evaluated for the selected parameters such as area of disease development, expansion rate of anthracnose lesion and the number of days taken for the anthracnose symptom to appear. *In vitro* experiment was carried out to evaluate the growth of causative pathogen *Colletotrichum musae* on potato dextrose agar. The parameters measured *in vitro* were growth rate of mycelia, mycelial inhibition percentage and lag period of mycelial growth. The severity of disease was evaluated against inorganic salts and combined treatment of inorganic salts with hot water in both *in vivo* and *in vitro* experiments. Incidence of disease development was significantly ($p<0.05$) reduced by the application of GRAS compounds. Among the non-fungicidal approaches tested, integrated approach of sodium carbonate with hot water treatment gave the highest performance in controlling anthracnose in banana similar to fungicide application. In addition, the combination of salts with hot water treatment showed high efficacy in controlling anthracnose than the treatments with salts alone. Therefore, the integrated approach could be used as an alternative to synthetic fungicide and could eliminate the application of fungicide during the postharvest process of banana. Hence, combination of sodium carbonate with hot water treatment could be a commercially acceptable and economically feasible non-fungicidal approach for the postharvest control of anthracnose during the storage of banana.

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AGRICULTURAL CHEMISTRY

FORMULATION AND STORAGE OF LOW CALORIE CABBAGE (*Brassica oleracea* L. Var. capitata) - LIME (*Citrus aurantifolia)* BLEND READY-TO SERVE (RTS) FUNCTIONAL BEVERAGE.

J. Indhuja

ABSTRACT

In the last decades, special attention has been paid towards edible plants, especially those that are rich in secondary metabolites (frequently called phytochemicals) and nowadays, there is an increasing interest in the antioxidant activity of such phytochemicals present in diet. In this regard, functional foods play an important role, offering a new kind of health tool that promises specific effects related to particular food components. In recent years there has been a significant increase in consumer demand for low calorie products. Recent reports suggest that cruciferous vegetables act as a good source of natural antioxidants. Therefore, a research was conducted to formulate the low calorie cabbage-lime blend RTS functional beverage and to assess the quality attributes during storage. Considering the results of preliminary studies six formulation of the low calorie functional RTS beverage were prepared by blending different ratio of cabbage and lime juice (27:3, 24:6, 21:9, 18:12 and 15:15) including control, where only cabbage juice was added. The prepared formulations were subjected to nutritional and sensory assessment after the formulation and during storage. Analyses were done at 2 weeks interval throughout the storage period. Nutritional parameters of titrable acidity, pH, vitamin c content, total sugar and total soluble solids and microbial studies were analysed for the low calorie RTS beverage. Sensory attributes of colour, aroma, taste, appearance and overall acceptability were evaluated by 30 semi-trained panelists using a seven point hedonic scale. The most preferred formulations including control were selected to storage studies. The formulations were stored at room temperature 30±1°C and 70.75% RH for 12 weeks.

The nutritional analysis of the fresh low calorie RTS beverage shown increasing trend in titrable acidity (from 0.32% to 1.3% as citric acid), vitamin C content (from 8.35mg/100g to 17.75mg/100g), total sugar (from 2.75% to 4.99%), total soluble solids (from 4.64 °Brix to 5.17 °Brix) with the increase of lime juice from 3% to 15%. The pH was reduced when the lime juice concentration increased. The sensory assessment of fresh low calorie RTS beverage revealed that there were significant ($p<0.05$) differences among the sensory attributes according to Friedman Test. Nutritional analysis of the stored RTS beverage revealed the declining trend in ascorbic acid, total soluble solids and pH and an increasing trend for total sugar, and titrable acidity. The nutritional analysis showed that there were significant ($p<0.05$) differences among the formulations. The sensory assessment revealed that there were no significant differences among the sensory attributed following storage. The highest overall acceptability was observed in formulation with 18% cabbage juice and 12% lime juice and the all formulations were microbiologically safe. Based on the quality assessment, sensory analysis and microbiological studies, the low calorie RTS functional beverage with 18% cabbage juice and 12% lime juice could be stored for 12 weeks without any significant changes and extend the shelf life, which also has no deleterious effect on consumers.

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DEVELOPMENT AND QUALITY EVALUATION OF NUTRITIONALLY ENRICHED COMPLEMENTARY FOOD FOR INFANTS

M. R. Roshana

ABSTRACT

Protein-energy malnutrition and micronutrient deficiency among children are the major health challenges in developing countries. It affects the child at the most crucial period, *i.e.* stage of development, which can lead to permanent impairment in later life. Usually cereals based fortified foods are introduced initially as the first complementary foods at the six months of infancy. Although, a number of convenient cereal formulas are available, they are often too expensive for the poor and middle income people. To overcome this problem present study was designed to aim at the formulation of low cost complementary foods that provide sufficient protein, vitamin and minerals for children. The complementary food mixtures were prepared from unpolished parboiled red rice flour, germinated green gram flour and carrot flour in the ratios of 100:00:00, 80:10:10, 70:20:10, 60:30:10, 50:40:10 and 40:50:10 respectively. The mixtures were subjected to nutritional (moisture, ash, protein, fat, fiber and carotene), organoleptic (colour, texture, taste, aroma and overall acceptability) and microbial analysis to evaluate the suitability of these complementary food mixtures for consumption and for long shelf life. The nutritional analysis of the complementary food mixture revealed that the moisture, ash, protein and fiber content increased and fat and vitamin A decreased with the increasing of the germinated green gram flour from 10 to 50%. The sensory assessment showed that, there were significant differences ($p<0.05$) among the treatments. Based on the quality characteristics, most preferred complementary food mixtures were selected and stored for 14 weeks at 30±1˚C and 75-80% RH. The results of storage studies showed the declining trends in ash, protein, fiber, fat and vitamin A and an increasing trend in moisture of the complementary food mixture. The results of nutritional analysis showed that, there were significant differences ($p<0.05$) among the treatments. From the overall acceptability rating, the complementary food mixture with 60% unpolished parboiled red rice flour, 30% germinated green gram flour and 10% carrot flour had the highest mean value compared with other tested treatments. There were no total plate counts observed in the formulated complementary food mixture during the entire storage period. The results indicated that the complementary food mixture with 60% unpolished parboiled red rice flour, 30% germinated green gram flour and 10% carrot flour contained 14.2% protein, 1.6% fiber, 2.06% ash, 1.91% fat, 6.28% moisture and 30.23 mg kg^{-1} vitamin A, and which could be stored for 14 weeks without any significant changes in the quality characteristics.

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IMPACT OF SLOW RELEASING FERTILIZER ON PERFORMANCE OF CHILLIE AND LEACHING LOSS OF NUTRIENTS

Miss. R.M.P.Harshani Rathnayaka

ABSTRACT

Over use of inorganic fertilizer leads to cause the adverse effects on environment and loss of soil fertility especially on sandy soil where the poor soil structure promotes heavy leaching of nutrients. Proper fertilizer management can reduce nitrate leaching while maintaining crop yield, which is critical to enhance the sustainability of crop production on sandy soils with poor water and nutrient-holding capacities. The goals of slow release fertilizer use is that no nutrient should be limiting for crop uptake, there should be improved nutrient uptake efficiency, and nutrient-leaching potential should be reduced. The present experiment was carried out to study the influence of multi - nutrients (NPK) slow release fertilizer on the nutrients leaching and soil fertility status of Chilli in sandy soil at soil science laboratory, Eastern University, Sri Lanka during June to November 2017.This slow release fertilizer was tested in comparison with split application of inorganic fertilizer and farmyard manure in a complete randomized design. These four treatments including control (without fertilizer) were replicated in to four times. In the first part of the experiment leaching column study was conducted. In two weeks interval leachates were analyzed for Nitrogen, Phosphorus and Potassium content. The results revealed that slow release fertilizer improved the soil fertility through reducing the total leaching loss of Phosphorus (0.557 mg/l) and potassium (0.866 mg/l) from soil columns. Split application of inorganic fertilizer recorded higher total Phosphorus (0.836 mg/l) and Potassium (1.03 mg/l) concentration in leachates. Total leached Phosphorus (0.399 mg/l) and Potassium content (0.63 mg/l) of farm yard manure was lower than slow release fertilizer and split application of inorganic fertilizer. Regarding to leaching loss of Nitrogen, slow release fertilizer recorded the higher total Nitrogen concentration in leachates (0.775 mg/l) than split application of inorganic fertilizer (0.719 mg/l) and farmyard manure (0.393 mg/l). Control, without any fertilizer or manure recorded least Nitrogen (0.137 mg/l), Phosphorus (0.189 mg/l) and Potassium (0.099 mg/l) leaching. At the second part of the study field experiment was conducted and the growth and quality parameters were analyzed. According to results growth and quality parameters of Chilli plants were not significantly increased when slow release fertilizer compared with split application of inorganic fertilizer. But highest Nitrate (1.11 mg/g), Phosphorous (7.27 mg/g) and potassium (0.84 mg/g) content were detected in Chilli plants which treated by slow release fertilizer. At harvest highest soil Nitrogen content recorded by slow release fertilizer treated soil (0.455 mg/g) and was followed by farmyard manure (0.300 mg/g) and inorganic fertilizer (0.248 mg/g). Among all the treatments Phosphorus availability was higher in farmyard manure treated soil (9.325 mg/g) and slow release fertilizer treated soil ranked second (8.435 mg/g).

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EFFECTS OF DIFFERENT TYPES OF ORGANIC MANURES ON SALINE SOIL PROPERTIES AT DIFFERENT INCUBATION PERIODS

Mohamed Sabeer Hamthiya

ABSTRACT

In Srilanka, salinization of agricultural lands is a serious problem prevailing in arid and semi-arid regions of the country. As it is believed that soil salinity can alter the organic matter turnover process. A laboratory incubation experiment was conducted at Eastern University, Sri Lanka during July to September 2017 to study the effects of different types of organic manures on evolved CO_2 in saline and non-saline soil at different incubation periods. A bulk soil sample was collected at 0-20 cm depth from salt-affected area at Vaharai. The main objective of the present study was to investigate the CO_2-C evolved dynamics of the salt-affected soil, amended with different organic manures. Also at the end of incubation changes of soil pH and electrical conductivity (EC) of the experimental soil was observed. Factorial combinations of two soil types (saline and non-saline soils) with four types of organic manures (i.e. poultry manure, farm yard manure, Glyricidia and partially burnt paddy husk) were used at the rate of 10 tha^{-1}. Data were analyzed using Statistical Analytical System (SAS) and means were separated by Duncan Multiple Range Test (DMRT). Results revealed that under saline condition (EC=7.13 dS/m), the highest CO_2-C release (352mg/100g soil) was observed in Glyricidia amended soil, followed by FYM (289.62mg/100g soil), PM (205.7mg/100g soil) and PBPH (96.43mg/100g soil). The CO_2-C evolved under non saline condition (EC=0.348 dS/m), ranged from 54.23mg/100g (PBPH) to 498.13 CO_2-C mg/100g (Glyricidia amended) soils. The application of Glyricidia organic amended in saline soil decreased soil pH and electrical conductivity (EC) from 7.16 to 6.66 and 7.16dSm^{-1} to 6.36dSm^{-1} respectively. The results of this study suggested that the application of Glyricidia leaves proved to be the best organic manure to improve the microbial activity and the amount of CO_2-C released in saline environment and incorporation of Glyricidia could be used as an ameliorative way in improving saline soil. Results could be concluded that the response pattern of decomposition of organic manure incorporated to the soil depended on salinity stress level and duration of incubation.

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IMPACT OF NATURAL FARMING SYSTEM, CHEMICAL FARMING SYSTEM AND CHEMICAL PADDY CULTIVATION ON PHYSICAL, CHEMICAL AND BIOLOGICAL PROPERTIES OF SOIL, VAHARAI, BATTICALOA

D.M.D.J. Bandara

ABSTRACT

Soil physical, chemical and biological properties were compared among natural, chemical paddy and chemical farm in Vaharai, Divisional secretariat division of Batticaloa district. Composite soil samples were processed, labelled and stored room temperature for physical, chemical and biological properties analysis. All the experimental data were analyzed statistically with Duncan Multiple Range Test (DMRT) at 5% significant level by using SAS application statistical package. Analyzed soil physical, chemical and biological properties were compared among those three farming systems. Natural farming had improved the physical, chemical and biological properties of compared to other two farming systems. The result indicated that the average mean values of soil bulk density lower as (1.21 g/cm^3), while water holding capacity, phosphorus and potassium higher as (123.33%), (6.2*10^{-3} %), (0.005 %) in natural farming. Also porosity, organic matter, microbial activity and microbial count were significantly higher as (47.61 %), (2.56 %), (88.44 mg CO_2 / 10g Soil), (2.37*10^5 CFU/1g soil) and particle density significantly lower as (2.31 g/cm^3) in natural farming. According to my study chemical farm had improved soil reaction (pH) and electrical conductivity (EC). But natural farming was found better improvement in physical, chemical and biological properties.

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EFFECT OF EPPAWALA ROCK PHOSPHATE AND TRIPLE SUPER PHOSPHATE ON GROWTH AND YIELD OF COWPEA *(Vigna unguiculata .sp)*

S. Modshayini

ABSTRACT

The solubility of Rock Phosphate (RP) has been confirmed as constrain of direct use to annual crops as a phosphate source and also it was limited to perennial crops,Phosphorus deficiency is major problem in the tropical soil. Productivity of most legume crops limited in the sandy regosol due to the lack of the availability of phosphorus. sandy regosol is a major group of soil in Batticaloa District,Sri Lanka. A pot culture experiment was conducted at Eastern University, Sri Lanka during July to September 2017 to investigate the effect of various Phosphorus rates 18kg P_2O_5/ha,36kg P_2O_5/ha and 54kg P_2O_5/ha in form of Eppawala Rock Phosphate(ERP) and dissolving agents (compost, Sulphuric acid, Triple Super Phosphate(TSP) with control) on soil phosphorus content, plant phosphorus content and growth parameters of cowpea. A bulk soil sample was collected at 0-20cm depth from Agronomy farm,Eastern University.It was processed and sieved through sieve. The experiment was laid out in a Completely Randomized Design(CRD) in a factorial manner with three replications.Results revealed that the application of ERP with dissolving agents in soil increased soil phosphorus content from 90.12mg/kg to 465.998 mg/ha (at harvest). Among all applications 54kg P_2O_5/ha in the form of ERP with TSP proved to be the best to increase the growth components in sandy regosol soil. Highest phosphorus content in plant was obtained at 54kg P_2O_5/ha with TSP of combination and followed by 36 kg P_2O_5/ha, 18 kg P_2O_5/ha combination compared with other dissolving agents (compost and Sulphuric acid) and control.The results of this study suggested that incorporation of TSP and ERP could be used as effective way to increase the phosphorus availability in soil.

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EFFECT OF CONVENTIONAL, ORGANIC, AND NATURAL FARMING SYSTEM ON SOIL PROPERTY AND YIELD OF CHILLI.

I.G.I.Dunston

ABSTRACT

Due to increasing rate of population the food availability is limited and farmers are adopting different farming systems to meet the demand. But sustainable and successful management of resources for agriculture to satisfy changing human needs, without degrading the environment or the natural resources is lacking. Therefore, this study was conducted at Agronomy farm, eastern university during October to December, 2017 to study the impact of organic, natural and conventional farming systems on physical and chemical properties of soil and also to evaluate the soil fertility status of the same. Three different farming systems were practiced in randomized complete block design with five replications and fifteen plots were labelled. To find out the most suitable farming system, waruni variety of cowpea was selected and grown. Period from 2nd week to 5th week the growth parameters such as plant height, leaf number, branch number, days to fifty percentage flowering were observed and recorded. The yield parameters such as pod number and pod weight were observed and recorded. Initial and end (60 days after planting) soil samples were collected and soil properties such as bulk density, particle density, porosity, electrical conductivity, organic matter content, and microbial activity were analyzed. All the experimental data were analyzed statistically with Duncan Multiple Rang Test (DMRT) at 5% significant level by using SAS 9.1 application statistical package. Analyzed growth parameters and soil physical and chemical properties were compared among those three farming systems. Natural farming had improved in growth performance, physical and chemical properties of soil compared to other two farming systems where the low level of bulk density and particle density were found as 1.1331 gcm^{-3}, 2.4715 $gcm^{-3}$and high level of plant height, leaf number, branch number, pod number, pod weight per plot, porosity, electrical conductivity, organic matter content and microbial activity were found as 39.556cm, 23, 7, 261.4, 176.646g, 54.1503%, 67.2µs, 5.9871% and 87.3491 mg CO_2/ 1g soil respectively. Moreover, natural farming system was found to have better improvement than organic and conventional farming system in above growth parameters, physical and chemical properties of soil. This study also showed that the natural farming system improves the soil properties with minimum negative impact on the environment.

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AGRICULTURAL ECONOMICS

ECONOMIC ANALYSIS OF SMALL SCALE FLOWER FARMING INDUSTRY IN SELECTED AREAS OF NUWARA ELIYA DS DIVISION AT NUWARA ELIYA DISTRICT

Durairaj Nirosha

ABSTRACT

This study was on Economic analysis of small scale flower farming industry in selected areas of Nuwara eliya DS division at Nuwara eliya district. The study was mainly based on primary data obtained from a sample survey in four GN divisions at Nuwara eliya DS division at Nuwara eliya district. Both primary and secondary data used in this study.100 small scale flower farmers in the study area were selected as the respondents and primary data was collected through pretested questionnaires. The random sampling method was used for the primary data collection among the small-scale farmers in Nuwara eliya DS Division and secondary data also used. Data was analyzed using SPSS and MS Excel. Descriptive statics, Frequencies, Gross margin analysis, Benefit Cost Ratio, Breakeven analysis and Regression analysis were done. Socioeconomic features of farmers, marketing sources of flowers and flower products, cost of production of flower farming and constraints in small scale flower farming were studied. Results indicated that the average age of the respondents was 41 years. Average years of schooling was 10 years. 59% of farmers doing flower farming as subsidiary occupation for part time. 82% of the small-scale flower farmers had own land.69% of farmers had grown roses as it well suited for the climate in Nuwara eliya and also Daisies, Chrysanthemum and Anthurium cultivation were practiced. The study found that majority (83%) of farmers use family members for farming. It was found that lack of preservation facilities between harvesting to marketing, higher transportation cost, lack of modern cultivation technologies, Lack of quality planting materials and drought caused by the reforestation at the area were the major problems faced by small scale flower farmers. 45% of farmers sell their products to flower collection centers.65% of farmers were obtained loan for flower farming. 29% farmers only exposed to extension services and 56% of farmers participated in the training programs. Regression model result reveal the age of the respondent, education qualification in schooling years and marital status had significant impact on total income by flower farming per month. The average total cost of cultivation of Rose, Anthurium, Daisy and Chrysanthemum were Rs 28350/=, Rs 24500/=, Rs 24726/= and Rs 23643/= per annum per 1000sq.ft. According to the gross margin analysis the net profit for Rose, Anthurium, daisies and Chrysanthemum were Rs 105650/=, Rs 55,500/=, Rs 137,274/= and Rs 74,357/= per annum per 1000sq.ft. Breakeven price of Rose, Anthurium, daisies and Chrysanthemum were Rs 2.95, Rs 2.72, Rs 1.71, Rs 1.31. Benefit Cost Ratio of Rose, Anthurium, daisies and Chrysanthemum were 5.07, 3.67,6.98, 4.56 where indicates that small scale flower farming was profitable and has potential for expansion in Nuwara Eliya District. Its recommended that better extension services for small scale flower farmers and supply of high quality planting materials to the farmers will increase flower production and improve farm income.

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AGRICULTURAL ENGINEERING

A CASE STUDY ON DRYING CHARACTERISTICS AND QUALITY OF MUSHROOMS FROM NATURAL CONVECTION SOLAR DRYER AND OVEN DRYING METHODS

V.Kopika

ABSTRACT

The study was conducted at Agricultural Engineering Laboratory and Agro Technology park, Eastern University, Sri Lanka, during September 2017 to October 2017. Oyster mushrooms were used for drying in this study. Different sizes of mushrooms were used to evaluate the size of the mushrooms on drying processes in natural convection solar dryer. Effective temperature for drying mushroom was examined by drying mushrooms in hot air oven at temperatures at 30°C, 40°C, 50°C and 60°C. Full and half mushrooms were dried in a natural convection solar dryer until the samples reached desired moisture content of 8.2%. Air temperature inside the dryer and outside the dryer, wind velocity, relative humidity and moisture loss were measured at every 2 hours interval. Mushrooms were kept in the oven at different temperatures such as 30, 40, 50 and 60 °C until the samples reached desired moisture content. The moisture loss was measured at every 1 hour interval. The colour of raw and oven dried and solar dried samples were compared. The effect of drying air temperature on drying characteristics of oyster mushrooms were investigated. The experimental results showed that the drying temperature and size of the mushroom had considerable effects on the moisture removal. In the study, average moisture content, average drying rate, drying duration, rehydration ratio and moisture diffusivity values of full mushrooms were found to be 3.79 %, 0.2 g min^{-1}, 22 hours, 2.4 and -10.084 × 10^{-9} m^2 s^{-1} respectively. In hot air oven, average moisture content, average drying rate, drying duration, rehydration ratio and moisture diffusivity values at 50 °C were found to be 13.44 %, 0.5 g min^{-1}, 6 hours, 2.33 and -10.08 × 10^{-9} m^2 s^{-1} respectively. The results revealed that among different sizes of mushroom, half mushrooms produced better quality product than full mushrooms during the drying process in the natural convection solar dryer. In oven drying, 50 °C can be considered as the effective optimum temperature for drying process of full mushrooms with acceptable moisture loss, average drying rate and drying time.

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DRYING KINETICS OF RED CHILLIES UNDER NATURAL CONVECTIVE SOLAR DRYER AND OPEN SUN DRYING

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ABSTRACT

The thin layer drying kinetics of chillies at different layers (*Capsicum annuum L)* were experimentally investigated in a natural convective solar dryer and in open sun drying. In both drying methods chillies with 1cm, 2cm and 3 cm layer thicknesses were used. The chillies were dried from an initial moisture content of about 81. 23% (w.b) to a moisture content of 7. 13% (w.b) and the moisture content of chillies were determined at 3 hours interval. The drying data were fitted with two thin layer drying models namely Page model and Henderson & Pabis model. The values of the drying constants for the models were determined. The performance of these models was investigated by comparing the correlation coefficient (r), chi-square and root mean square error (RMSE) between the observed and predicted moisture ratios. The dramatic moisture reduction of chillies took place during first day of drying process and the drying process followed a falling rate period. The effects of drying method and layer thickness of chillies on the drying characteristics and drying time of drying process were determined. The results showed that an increase in the drying layer thickness resulted in longer drying times. According to the moisture ratio predicted by both models, Page model and Henderson & Pabis model were suitable for drying chillies with 1 cm layer thickness in convective solar dryer. Both models satisfactorily described the drying rate of chillies with correlation coefficient of 0.814 in Page model and 0.852 in Henderson & Pabis model. Page model was found to be more suitable for open sun drying with the layer thickness of 3 cm as it satisfactorily described the drying rate with correlation coefficient of 0.989.

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ANIMAL SCIENCE

EFFECT OF DIFFERENT TYPES OF STABILIZER USE IN YOGHURT PRODUCTION

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ABSTRACT

This study was conducted to investigate nutritional, physical and sensorial properties of different stabilizer added to yoghurt at milk processing unit of Department of Animal Science, Eastern University, Sri Lanka 2017. This experiment was designed as Complete Randomized Design and consisted of five treatments and three replications. Different types of stabilizers were added to the yoghurt such as gelatin, sweet potato, cassava, citrus fiber and corn. Selected parameters were analyzed as chemical, physical and sensory basis. At day one, it was found that quality attributes such as dry matter, ash and titratable acidity were not sifnificantly ($p > 0.05$) different among the types of yoghurt samples and Fat, Reducing sugar, Total sugar and pH were significantly ($p<0.05$) different among the types of yoghurt samples. Syneresis was high after half an hour and two hours was corn stabilizer treatment. Which showed the highest values (26.91±0.02), (39.92±0.05), respectively. Gelatin stabilizer added yoghurt showed lowest value (25.20±0.10), (35±0.10), respectively. During the storage period, dry matter, ash content, total sugar, reducing sugar, pH, and titratable acidity significantly ($p < 0.05$) different between the yoghurt samples. In case of fat, slight changes were observed. During the storage period there was no significant difference in fat content among treatments. At the end of the storage period corn stabilizer added yoghurt showed highest value of dry matter content (23.56±0.12) and sweet potato stabilizer added yoghurt showed lowest value of dry matter content (18.4±0.18). At the end of the storage period corn stabilizer added yoghurt showed highest value of ash content (0.80±0.00) and Corn starch added yoghurt and sweet potato starch added yoghurt showed lowest value of Ash content (0.66±0.28) (0.66±0.14), Respectively. During the storage period corn stabilizer added yoghurt showed lowest value of reducing sugar content (2.05±0.04) than other treatments. During the storage period gelatin stabilizer added yoghurt showed lowest value of total sugar content (16.49±0.05) than other treatments. During the storage period citrus fiber stabilizer added yoghurt showed lowest value of pH (4.17±0.03) than other treatments. Titratable acidity of the treatments was increased with storage period. During the storage period citrus fiber stabilizer added yoghurt showed highest value of Titratable acidity (0.78±0.05). The results of the sensory evaluation showed that organoleptic parameters had influence on overall acceptability of yogurt product. According to the panelist preference of texture colour flavour and overall acceptability they preferred citrus fiber stabilizer added yoghurt.

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CHANGES OF ACIDITY LEVEL OF RAW CREAM AND THEIR EFFECTS ON FREE FATTY ACID VALUES OF THE BUTTER

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ABSTRACT

Butter is the one of milk food product, which is made exclusively from milk or cream. Butter is a source of vitamin A and certain essential fatty acids. High free fatty acid in butter badly affects to the consumer preference. But free fatty acid can give some good characters also to the butter. Therefore, present study was planned to identify the milk and raw cream quality parameters and evaluate the yield and free fatty acid of butter by using different combinations of milk fat levels and cream acidity level. In this study, milk samples were collected from milk bowsers which came from different chilling centers and milk fat, acidity, specific gravity and keeping quality of milk were studied. Similarly, raw cream samples were collected with different acidity levels and corresponding free fatty acid values of butter were studied. Further, raw milk samples with different fat levels were also collected and corresponding butter yield was studied. As a result of this study of milk quality parameter, there was no any milk sample containing the hydrogen peroxide and highest and lowest specific gravity of raw milk was 29.5 and 26.3, respectively. Similarly, highest fat level and lower fat level of raw milk were 4.35% and 3.8%, respectively. During this study almost all the milk samples were recorded as good or excellent quality of milk. The higher acidity level of the raw milk was 0.18% and the lower level was 0.09%. The fat level of raw milk was positively correlated with butter yield. Free fatty acid level of the butter linearly increased with the acidic level of the raw cream.

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EFFECT OF CONTAMINATING WATER SOURCE ON MILK HYGIENE IN SMALLHOLDER DAIRY FARMING IN GAMPAHA DISTRICT

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ABSTRACT

The water used during handling and processing of milk products can be potential sources of microbial contamination with possible negative consequences on food safety. Especially, the water used in keeping the hygiene of milking and milk storage utensils is crucial to keep the quality and safety of the products. Therefore, the current study was designed to assess the bacteriological quality of water used for cleaning milking and milk storage equipment of smallholder dairy farmers in Hanwella area. For this study, petrifilm method was used instead of the conventional method to inspection total coliform counts and *E.coli* owing to ready to use and easy handling and it was used to enumerate coliform and *E.coli* in domestic water that is used by farmer. Then, conventional plating method was used to observe *E.coli* and milk sample and tryptone bile x-glucuronidase media was used for it. Around 90 of water sample (collected from the farmers) were collected from Hanwella and then milk samples were collected from same farmers who collected water sample and 80 of milk samples were collected. There were several type of water source such as wells (80%), natural springs (4.44%), municipal supply (13.33%), "prajamula" supply (1.11%) and tube-well (1.11%) and about 24.44% of samples are *E.coli* positive. Most of *E.coli* positive were from the well and few of them were from the other water source. In this study, when decrease distance between water source and toilet pit increase the total coliform count/100 ml, in water and similarly with distance of the cattle shed. When increase the depth of the well, increase the total coliform counts/100 ml in water source. According to the result of study, contaminated water and poor hygiene practices of the farmers have effected on the raw milk in the study area. Finally chlorination, improve the hygiene practices of farmer can be suggested as a best and possible methods to overcome this problem.

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EFFECTS OF DIFFERENT TYPES OF LITTER MATERIAL ON BROILER PERFORMANCE

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ABSTRACT

This study was conducted to evaluate the effect of different types litter materials such as paddy husk, chopped newspaper, coir dust, and sand in terms of litter pH, litter moisture content and broiler performance (feed intake, body weight, weight gain, feed conservation ratio, carcass weight, heart weight, gizzard weight, cecum weight, spleen weight, dressing percentage and mortality). One hundred and ninety-two (192) day-old broiler chicks were obtained from a commercial hatchery. Then those birds were allowed to brood for one week. The chicks were grouped into four batches and each batch were contained forty-eight chicks and were randomly assigned to the four treatment litter using complete randomized design (CRD). The moisture content in different litter materials was significant ($p<0.05$) at different age of litter and litter types. The highest moisture content was recorded in coir dust at 5^{th} weeks of litter aging and lowest one was recorded in sand. The pH change in different litter materials was significant ($p<0.05$) at different litter age and between litter types. The highest pH change was recorded in coir dust at 5^{th}weeks of litter age and lowest one was recorded in newspaper. The birds reared on different litter materials showed significant ($p<0.05$) differences on feed conversion ratio, body weight, weight gain, spleen weight and gizzard weight. However, there was no significantly ($p>0.05$) affected on carcass weight, dressing percentage, heart weight, cecum weight and mortality rate. According above study coir dust may best litter over other litter.

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PRESENT STATUS OF GOAT FARMING IN ERAVUR, VANTHARUMOOLAI AND MAHAOYA VETERINARY RANGES

W. Sajith Ranga Fonseka

ABSTRACT

A survey of goat farmers was conducted in Eravur, Vantharumoolai and Mahaoya veterinary ranges in the Eastern Province. Aim of the study was to assess and document the socio-economic status of goat farmers, management system, feeding and nutrition, available resources and facilities, information of rearing goats and constraints in goat farming. A pre-tested structured questionnaire was administrated to randomly selected goat farmers. 40 goat farmers were selected randomly from each veterinary range. 120 goat farmers coded and entered in Microsoft Excel and transferred into SPSS for analysis. Higher male participation in goat farming was observed in the study area. Most of the farmers are married. Majority of the goat farmers were in 30-45 years range of age. Most of goat farmers had experience more than 5 years in goat farming. Majority of the farmers kept local breed of goats. Crosses of Jamnapari, Saanen, Kottukachchiya were available in most of the goat farms in the surveyed area. Majority of the goat farmers had low education level. Many of goat farmers not involved in home consumption of goat meat, milk or manure. They reared goats mainly for commercial purpose. Goats were reared predominantly under semi-intensive management system. Majority of goat farmers in Mahaoya veterinary range are not registered in veterinary office. Herd size were generally 11-20 in Eravur and Vantharumoolai while 21-30 in Mahaoya. It was depending on availability of resources and surplus labour in the family. In conclusion, it revealed that goats are mostly reared as the secondary income earning of house hold economies.

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AVAILABILITY OF WASTE MATERIALS FOR LIVESTOCK FEED AT THE ERAVUR D.S. DIVISION

Mohamad Aliyar Shakeer Ali

ABSTRACT

This study was carried out on the availability of waste feed materials from waste generating places such as vegetable stalls, fruit stalls, grocery, beef stalls, fish stalls, chicken stalls, hotels and bakery at the Eravur Divisional Secretariat of Batticaloa district. More specially, this study deals with identifying availability of vegetable waste, fruit waste, meat waste, fish waste and other feed by products at the waste generating places. This study was conducted using sample of one hundred and sixty from eight waste generating places from Eravur DS division in Batticaloa District. Stratified random sampling technique was used to draw the sample. Structured questionnaires, personal observation and key informants were the methods used to collect the primary data and secondary data obtained from government institution and key organizations. Tool of data analysis included descriptive statistics and frequencies by using statistical software of SPSS. Aspects of socioeconomic characteristics of farmers, monthly income, quality of feed waste, customer demand of feed waste, preference of feed waste to use as livestock feed were studied. Lack of education of the sellers and farmers, low quality of feed waste, lack of waste treatment facilities and lack of demand, were most important constraints. The study revealed that 95.6% of the sellers at the Eravur Divisional Secretariat of Batticaloa district were male and 4.4% were female. The ethnicity distribution revealed 0.6% sellers were Hindu and 99.4% Muslims. The maximum numbers of sellers (39.38%) were in the age group of 30-40 years where as 29.38%, 15.63%, 13.75%. 1.25% and 0.63% were reported for the age group of 40-50, 50-60, 25-30, <25 and > 60 years of age respectively. The education level revealed that 0.5% no schooling sellers, 11.9% primary educated sellers, 43.8% secondary educated sellers and 43.8% advanced level. The average overall family size was 35. The average monthly income was Rs. 33,500 /= and 37.5% sellers were 10-20 years well experienced. Mostly available type of waste feed was meat (50.73%) and fish, vegetable, fruit, chicken, hotel waste, bakery waste and grocery waste were 3.49%, 2.87%, 3.22%, 21.19%, 8.71%, 8.24% and 1.53% respectively. Mostly available meat waste were chicken and beef. Although pineapple, apple and papaya were commonly available fruit waste in the stalls. Pineapples waste is most prominent. Considering about vegetable brinjal and leafy vegetables were generated more amount of waste at the stalls. The results revealed that 42.5% of feed waste were with intermediate quality level and other 33.1% and 24.4%were with high and low-quality levels. The results revealed that 79.4% of survey respondents state that farmers were not demanded feed waste, 15.6% and 5% of respondents were with intermediate and high-quality levels respectively. The results revealed that 34.4% of survey respondents' state that farmers were not preferred food waste to use as livestock feed and only 3.1% of respondent state that farmers were with highly prefer, 31.3% of respondent state that farmers were with not prefer and 31.3% of respondent state that farmers were with less prefer. That may be due to the lack of knowledge about amount feed waste generation from the waste generating places and also may be due to contamination problem of feeds.

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PRESENT STATUS OF FISHERIES IN NORTHERN PART OF BATTICALOA LAGOON

Thankarathinam Suman

ABSTRACT

Nowadays popularity and demand for fish had increased substantially among the society. In Sri Lanka fish are highly available in water bodies such as lagoons. However, data availability of status of fish production in Sri Lanka is limited. Batticaloa lagoon is the main potential area for the production of fish when compare with other lagoon bodies in Sri Lanka. Therefore, a study was conducted to assess the present status of fish production in Northern part of Batticaloa lagoon with the objectives of to quantify the total yield of Batticaloa Lagoon, to identify the fishing method and catch species in Northern part of Batticaloa Lagoon and to identify the seasonal maximum yield in Northern part of Batticaloa Lagoon. This study was conducted in Northern part of Batticaloa lagoon of. A pre-tested structured questionnaire was used to collect the information. Stratified random sampling was used to select the fishers and a total number of 50 fishers were interviewed during the Held investigation. The collected data were analyzed by using SPSS 22.0 statistical software. The fish species were identified by visual observation. The fishers of Batticaloa lagoon depended mainly on fishing for their livelihood. Majority of the fishers' main occupation (74%) was fishing and other as part-time job (26%). The fishers had good indigenous knowledge about fishing. September to March is the peak fishing season because of sea water is directly connected to the lagoon due to rain water. Tilapia (15.60%), cat fish (14.50%), herrings (14.33%) and genes spp. (11.33%) types of fish are the highly caught by Batticaloa lagoon fishers and crabs (0.88%) are caught at low rate. Among the fish crabs and prawn was the most expensive one and highly demanded. However, the marketing facilities of the fish were low. A big proportion of the collected fish sold at market and road side of Batticaloa area. The functions of fishery co-operative societies in Batticaloa were not satisfied by fishers. The level of extension services reached to the study area was very low. The main constraint in fish production threat was adverse climate. Other problems of the fishers were lack of equipment low fish population or fishing yield, weak selling prices for fish, problems in getting credit, low extension services, poverty and various physical affects. Market facilities, export facilities, extension services, credit facilities and community empowerment programs should be given to the fishers of Batticaloa lagoon to improve their income and living standard.

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UTILIZATION OF BROILER MEAT PROCESSING WASTE TO DEVELOP A COMPOST

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ABSTRACT

Broiler industry in Sri Lanka has shown a phenomenal growth over the recent past. There are three grandparent farms and nearly 33 registered breeder farms operating in Sri Lanka. Moreover, there are more than 15 chicken meat processors in the country. “Meat washing” is one of a main step in Broiler production. As a result of this water become contaminated. Broiler companies not only face environmental and social problems, but also they expend huge amount of money to avoid the bad effect of contaminated water. Therefore, an experiment was conducted to reduce the environmental and social problem, save the money to remove the waste and also gain additional income through process waste into compost. Veehena farm, Mahavewa was the experimental site for this study. Compost heaps were prepared by using waste sludge from meat washed water, Gliricidia leaves, straw ash and poultry litter. The compost heaps were prepared with 100%, 75%, 50% and 25% level of sludge. Three replications per one treatment were allocated in a Factorial Completely Randomized Design. The treatments were T1-100 % sludge, T2-75% sludge + 8.3% Gliricidia leaves + 3.3% straw ash + 8.3% poultry litter, T3-50% sludge + 16.6% Gliricidia leaves + 16.6% straw ash + 16.6% poultry litter, T4 - 25% sludge + 25% Gliricidia leaves + 25% straw ash + 25% poultry litter. The T4 recorded the highest N content 1.25±0.01% and the least 0.42±0.01% was in T1 in the 8th week. Highest P content 1.20±0.005% obtained in T4 and least 0.41±0.005% in T1. The T4 recorded the highest 1.27±0.01% K content and the least 0.42±0.01% was in T1. There was also significant difference between the treatments on pH and moisture content at $p<0.05$ level. This experiment revealed that 25% broiler waste sludge mixed with equal amounts of Gliricidia leaves, paddy straw

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STATUS OF FRESHWATER RESERVOIR CAPTURE FISHERIES IN PAHATHARAWA RESERVOIR OF MONARAGALA DISTRICT

D. M. Thushara Indika

ABSTRACT

Inland fisheries are important sector in world when consider food security. It makes critical contribution to development in the areas of employment. Inland fisheries provide income to fishermen which sustain their living standards. In the aspects of nutrition, fisheries provide a cheap source of protein to fulfil the human dietary requirement. However, because of modern technology, the descendant of fishers is not willing to choose fishing as their livelihood. This may lead to reduction in fish production which in turn increases the dependency for protein source from other expensive source. In this context a study was conducted in Pahatharawa Grama Niladhari (GN) division of Monaragala District to analyze the current trend of reservoir fishery in Pahatharawa reservoir. A questionnaire survey was conducted during from September to December 2017 to collect information from inland fishers of Pahatharawa reservoir on their socio-economic conditions, current fish production, and problems faced by the fishers in fishing activities. Secondary catch data was collected from the fisheries cooperative society in Pahatharawa. All the data collected from fishermen from Pahatharawa reservoir were analyzed in SPSS version 22.0 (Statistical package for social science), SAS 9.1. statistical package and Microsoft spread sheet. The study showed that a majority of the fishers (97%) in Pahatharawa area were Buddhist whose age ranged from 40 to 50 years. Majority of inland fishermen (67.6%) in the study area have low education level (below O/L) and majority (55.8%) fishermen spouse also has low education level (below O/L). Majority of fishers' children are having high education level (up to O/L) than their parents. Pahatharawa fishers' average monthly income is Rs 31 823.00 ±30.37 and majority (58.8%) of fishermen earn average monthly income is Rs 12 029.41±24.5 from fishing. Pahatharawa reservoir fishers are living in 2 km surrounding of Pahatharawa reservoir and majority of the fishers (97 %) willing to continue fishing in future. In conclusion, the fish production in Pahatharawa reservoir is high during February and March and low in August. However, there are problems in reservoir fishery in the study area such as lack of fishing gear and fishing by outsiders. Therefore, necessary actions should be taken to develop the inland fisheries in Pahatharawa to improve the livelihood of inland fishermen.

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CROP SCIENCE

IN VITRO REGENERATION OF TOMATO (*Lycopersicon esculentum* Mill.) AS INFLUENCED BY BAP AND SALT (NACL)

B. Shiyamala

ABSTRACT

Tomato (*Lycopersicon esculentum* Mill.) is an important crop plant cultivated all over the world, and its production and consumption continuously increasing. Protocol for *in vitro* regeneration can provide advantage for the production of stress tolerant cultivars. This study was conducted to develop an efficient protocol for the regeneration of tomato (*Lycopersicon esculentum* Mill.) *var* KC 1 for the tolerance against salt stress at the Plant Tissue Culture Laboratory, Eastern University, Sri Lanka. The first experiment was done to obtain the suitable explant for the multiple shoot production in the medium fortified with 2.0 mg/l BAP (6-Benzyl amino purine) and 0.2 mg/l NAA (Naphthalene acetic acid). Different types of explants derived from 12 day old seedlings were used for this experiment. Cotyledon nodes were exhibited better *in vitro* response. *In vitro* shoot regeneration frequency was significantly higher when cotyledon explants were used as explants and they produce somatic embryos as well. From the cotyledons, somatic embryos were formed in indirect callus phase. The second experiment was done to select the suitable concentration of BAP for the *in vitro* culture. Different concentrations of BAP were tested. Cotyledon and hypocotyl explants were used as explants in this experiment. Among the media and explants, MS medium fortified with 1.5 BAP and 0.2 NAA was exhibited better result for the shoot regeneration from hypocotyl and medium with 2.0 BAP and 0.2 NAA was exhibited better result for the shoot regeneration from cotyledons after 4 weeks of culture. Among the four levels (0, 1.0, 1.5 and 2.0 mg/l) of BAP employed in Murashige and Skoog (MS) media, 2.0 mg/l BAP was found superior in growth traits (callus and shoot formation). No significant difference was noticed between cotyledon and hypocotyl explants on medium having 2.0 mg/l BAP. Last experiment was done to assess the *in vitro* response of hypocotyl explants to the salinity stress and to develop a protocol for the salt tolerant cell lines for the tomato variety KC1. Both explant and growth regulator concentrations influenced shoot proliferation. Hypocotyl explants were excised from *in vitro* grown seedlings and inoculated onto MS medium supplemented with 1.5 mg/l BAP, 0.2 mg/l NAA and salt. *In vitro* morphogenesis is greatly influenced by plant growth regulators and NaCl. It was observed that morphology of hypocotyl was significantly different from the salt and control media. And also after four weeks of culture, the fresh weight and colour of callus was observed and it was compared with the salt free media (0 mM) which showed a significant different in each explant portion. The results revealed in hypocotyl explants the different portion could exhibit different response to the salinity. And when the concentration of salinity increased there was a significant difference in the *in vitro* response. Fresh weight of callus was higher in both control (0 mM) and 15 mM salt medium (MS + 1.5 mg/l BAP + 0.2 mg/l NAA). Also the hypocotyl top portion produced shoots from the 35 mM salt media but with the distinct necrotic patches.

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DEVELOPMENT OF THE ANTHER CULTURE TECHNOLOGY FOR CAPSICUM (*capsicum annuum* L.) BY USING BREEDING LINE 1782 AND VARIETY LANKA YELLOW WAX

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ABSTRACT

The plant breeding programs can be accelerated through double haploid plant production of capsicum. One of the easier ways to produce double haploid plants is anther culture. This experiment was carried out to induce anther callus of *Capsicum annuum* L. breeding line 1782 and for the comparison of its behavior in callus induction procedure, a recommended variety of *Capsicum annuum* L., Lanka Yellow Wax (LYW) was selected. It is a locally available *Capsicum* variety. Four callus induction media were used as treatments for Complete Randomized Factorial Design. Anthers were selected based on microscopic observations. Anthers of *Capsicum annuum* L. in late uninucleate stage and early binucleate stage could induce callus formation. The four callus induction media included MS basal medium and different concentrations of hormones 2,4-D (1 mg /L) with BA (2 mg/L), 2,4-D (2 mg/L) with BA (2 mg/L), BA (2.5 mg/L) with 2,4-D (2 mg/L) and BA (3 mg/L) with 2,4-D (2 mg/L). The cultured anthers were incubated in dark for 14 days at 25^0C for anther callus induction. Data were collected in number of anthers planted and number of calli produced by anthers. Contamination of callus was high in medium 4 (30%) and low (20%) in other media. After the callus induction, selected calli were transferred into a regeneration medium, which included MS basal medium with 1 mg/L IAA and 5 mg/L BAP. Regenerating cultures were incubated 16 hrs. in light and 8 hrs. dark conditions at 25 ^{0}C and observations were taken for calli growth, appearance and greening of calli. Medium 1, medium 3 had significant effect on anther callus induction especially than medium 2 and medium 4. The swollen percentage of anthers, induced callus percentage were high and the time taken to callus induction was minimum and also the size observed in produced callus were high in medium 3 than other callus induction media. However, medium 1 and 3 performed in same manner for callus induction for both 1782 and LYW varieties but highest performance showed by medium 3. In 1782 breeding line and LYW variety comparison, it was found that LYW variety was better than 1782 breeding line and had a significant (P<0.05) effect on anther callus induction. The callus induction percentage of 1782 was 59.629% and it was lower than LYW (83.875%). There was no significant interaction effect between treatment factor and variety factor according to GLM procedure with CRD Factorial Design. Regeneration medium (5 mg/L BAP with 1mg/L IAA) in which calli were grown needs to be improved with different concentrations of those hormones. Best performance at selected regeneration medium was showed by the callus which grown in medium 3 and 1782 breeding line performed well than LYW variety at regeneration procedure. In the regeneration medium, calli behaved in different ways. White crystalline calli responded well to the regeneration medium and calli enlargement and, greening at later stage was observed. Light brown coloured calli did not show enlargement and, greening like in crystal calli. Presterilization of flower buds prior to the general surface sterilization procedure is a successful approach in preventing microbial contamination of culture plate, instead of spraying alcohol, dipping in alcohol for few minutes is preferable to avoid burning of flower buds. Most preferable surface sterilization method was method 2 (using 50% Daconil (Chlorothalonil) with 70% alcohol). This anther callus induction technology can be used as a convenient method to induce calli in *C. annuum* L.

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EFFECT OF POTTING MEDIA ON SURVIVAL AND GROWTH OF TRANSPLANTED *IN VITRO* PLANTLETS OF ORCHID (*DENDROBIUM* SP)

J. M. T. Lakshanthi

ABSTRACT

Orchids, the most beautiful flowers in God's creation, comprise a unique group of plants. They occupy top position among all the flowering plants valued for cut flower production and as potted plants. They have known for their longer lasting beautiful flowers which occupy a very high price in the local and international market. Micropropagation has become very important nowadays to meet growing market demand, there are still some barriers that prevent the ultimate goal to achieve viable *ex vitro* plants. Therefore, acclimatization has remained very serious issue. The present study was carried out to standardize potting media for hardening of the *in vitro* raised plantlets of *Dendrobium* sp. under net house conditions. The potting media used for acclimatization contained coconut husk, brick pieces, charcoal and chip stones in different ratios. The observations were recorded on survival percentage, shoot length, number of leaves per plant, leaf width, number of roots per plant and length of longest root after transplanting to *ex vitro* conditions. The treatment contained coconut husk: brick pieces: charcoal: chip stones at ratio 1:1:1:1 proved the best potting medium for higher survival rate (90.00%) at 4 weeks after transplanting to *ex vitro* conditions and for the subsequent development of plantlets under *ex vitro* conditions during the process of acclimatization. Furthermore, another study was designed to analyze socio-economic status of small and medium scale orchid farmers in Nattandiya DS Division, Puttalam District, North Western Province, Sri Lanka. Simple random sampling technique was used to draw the sample. Data were collected through pretested questionnaires and were analyzed using statistical software SPSS for frequencies. Most of the farmers were involved in cultivation of *Dendrobium* sp. It has high demand in the local market. Another experiment was conducted at the Tissue Culture Laboratory, Eastern University, Sri Lanka to study the *in vitro* regenerative performance of different explants of orchid. Therefore, various types of explants namely, base and tip of leaves, nodal segment, and stem segments (entire and half) were excised from the healthy mother plant. Sterilized explants were separately cultured on MS medium containing 2.0 mg/l BAP and 0.2 mg/l NAA aseptically. The result revealed that *in vitro* response percentage of the cultured explants clearly showed significant difference ($P<0.01$) among the treatments. Nodal segments showed higher *in vitro* response and better survival rate (88.86%). Immature leaf segments and stem segments showed moderate *in vitro* response but the survival rate was significantly high (55.50%) in immature leaf tip at four weeks of culture. Mature leaf segments failed to show *in vitro* response and very low survival rate.

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FOLIAR APPLICATION OF SEAWEED LIQUID EXTRACTS ON GROWTH PERFORMANCE OF *GLYCINE MAX* (L.)

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ABSTRACT

Ample amount of seaweed varieties found in the world which are usable for many purposes. Those are most valuable plant source found in the coastal areas. Due to the high fertilizer and pesticide usage in the world, people are facing lot of health problems and environmental issues. Farmers are using chemicals to increase growth and yield of plant or to reducing the pest and weeds problems. Instead of chemicals usage, seaweeds are better alternative to minimize those problems. In this regard, the first experiment was conducted to find out the seaweeds availability in the coastal Pasikudah area. Three different species available in plenty were identified in the experimental area and their Physio-Chemical properties were investigated. Hence, the first experiment revealed that *Sargassum crassifolium* has Nitrogen (1080 ppm), Phosphorous (192 ppm) and Potassium (4200 ppm), *Turbinaria turbinata* has Nitrogen (800 ppm), Phosphorous (28 ppm) and Potassium (3800 ppm), *Halimeda opuntia* has Nitrogen (500ppm), Phosphorous (33ppm) and Potassium (1170 ppm), Among the three species two most abundantly available species of *Sargassum crassifolium* and *Turbinaria turbinata* were selected for second pot experiment using two soybean varieties namely Pb-1 and MISB 01 as recommended by the Department of Agriculture, Sri Lanka. The pot experiment was conducted in the Crop Farm, Eastern University, Sri Lanka to find out the effect of seaweed liquid extracts (*Sargassum crassifolium* and *Turbinaria turbinata*) on growth performance of two soybean varieties (Pb-1 and MISB 01). The Pb-1 and MISB 01 are the most popular varieties used for cultivation in Sri Lanka. The experiment was arranged in a factorial Complete Randomized Design (CRD) with six treatments and eight replications. Once a week seaweed extract 20% was applied to both soybean varieties at weekly interval up to 6 weeks after planting and their performance were recorded. Foliar seaweed extract applications of both seaweed varieties had significant ($p<0.05$) effect on the tested parameters of two soybean varieties. All the tested growth parameters were significantly affected by Seaweed Liquid Extracts (SLE). Foliar application of *Sargassum crassifolium* extract and *Turbinaria turbinata* extract increased plant height (14.7% and 11.97%), leaf number (23.5% and 19.08%), leaf area (98.4% and 51%), Chlorophyll content (10.29% and 10.55%), number of flowers (133.89% and 87.08%), nodule numbers (176% and 88%), effective nodules (165.2% and 65.2%), nodule weight (147% and 90.26%), fresh shoot weight (72.61% and 46.03%) and dry matter content of shoot (107.7% and 50.9%) respectively, in MISB 01 variety. The application of *Sargassum crassifolium* and *Turbinaria turbinata* foliar extracts increased plant height (11.0% and 8.26%), leaf number (32.09% and 25.92%), leaf area (96.04% and 59.12%), chlorophyll content (18.2% and 17.49%), number of flowers (104.25% and 29.78%), nodule numbers (130.4% and 47.82%), effective nodules (115.54% and 42.01%), nodule weight (221% and 135.23%), Fresh shoot weight (30.81% and 21.38%), dry matter content of shoot (93.52% and 59.11%) respectively in Pb-1. Among two seaweed varieties, *S.crassifolium* giving the highest performance compared to the *T. turbinata* on number of flowers, number of nodules, nodule weight, effective nodules and biomass of both soybean Pb-1 and MISB 01 varieties. Therefore, this experiment concluded that *Sargassum crassifolium* seaweed liquid extract can be used to increase the growth performance of both soybean varieties of Pb-1 and MISB 01.

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APPLICATION OF DIFFERENT LEVELS OF COMPOST AND BIOCHAR ON GROWTH PERFORMANCE OF *GLYCINE MAX* (L.)

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Abstract

Biochar is a black carbon product derived by the pyrolysis of organic materials. Compost is the product of degraded organic matter by composting process. Both are cost effective and environment friendly soil amendments which is used in the crop production to improve plant available nutrient content. In this context, experiment was conducted to identify the effect of different levels of compost and biochar on the growth performance of *Glycine max.* (L). The pot experiment was conducted in a Crop Farm, Eastern University, Sri Lanka. The experimental design was Complete Randomized Design (CRD) with six treatments and six replicates. In this experiment different levels of compost with biochar and inorganic fertilizer was used. The treatments were T1- 100% compost, T2-75% compost with 25% biochar, T3-50% compost with 50% biochar, T4- 25% compost with 75% biochar, T5- 100% biochar and T6- inorganic fertilizer (control). The growth parameters were statistically analyzed and the outputs showed significantly ($p<0.05$) increase among the treatments on plant height (3.25%), number of leaves (13.04%), leaf area (17.25%), chlorophyll content (15.2%), number of flowers (12.67%), nodule numbers (27.74%), effective nodules (39.16%) and the total biomass (16.52%). Plant height, number of leaves and the chlorophyll content was not significantly affected at the initial stage. However, all the observed parameters were statistically significant at 6^{th} week after planting. The experiment revealed that T4 treatment (25% compost with75% biochar) showed significant increase in number of leaves, leaf area, chlorophyll content and number of flowers when compared to other treatments. However, total biomass in T4 and T6 treatments were not significantly different. Therefore, 25% compost with 75% biochar could be used instead of inorganic fertilizer as an environmental friendly way to enhance the growth performance in *Glycine max* (L.)

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EFFECT OF COMPOST AND POTASSIUM ON BRONZING SYMPTOMS AND YIELD OF RICE GROWN IN IRON TOXIC SOILS IN LOW COUNTRY WET ZONE

Chamali Dilrukshi Bulathge

ABSTRACT

A field experiment was conducted to study the effect of compost and potassium on bronzing symptoms and yield of rice grown in iron toxic soils in Low Country Wet Zone were conducted at the Regional Rice Research and Development Centre, Bombuwala during the period May to October 2017 with the variety of BW-272-2b. The experiment was undertaken with five different inorganic and organic fertilizer combinations viz., Control, Recommended rate (organic and NPK), Recommended rate + 25% additional K, recommended + 6 t/ha compost, Recommended + 25% additional K +6 t/ha compost) on growth and yield of iron susceptible variety Bw 272-6b. The results showed that Fe toxicity had a significant influence on growth and yield of rice. Maximum yield was recorded in T3 i.e. Recommendation by Department of Agriculture + additional potassium 25%. This suggests that the effect of additional potassium increased the yield of rice grown in iron toxic soils. However, application of above treatment did not show any significant effects on reduction of bronzing symptoms and growth increase of rice. The result suggests that under the conditions in the experiment yield could be increased by 49% by the use of additional 25% potassium in combination with the recommendation of the Department of Agriculture which is the most suitable and beneficial rate for iron toxicity susceptible rice varieties in the Low Country Wet Zone.

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EFFECT OF TEMPERATURE AND DURATION OF POLLEN STORAGE ON SEED YIELD AND QUALITY OF HYBRID CHILLI (*Capsicum annuum* L.) UNDER POLYTUNNEL IN DRY ZONE

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ABSTRACT

An experiment was undertaken to study the effect of temperature and duration of pollen storage on seed yield and quality of hybrid chilli (*capsicum annuum* L.) under polytunnel in the Dry zone during the period June 2017 to November 2017. Galkiriyagama inbred line as male parent and MI Waraniya inbred line as female parent from Department of Agriculture, in Sri Lanka were used as parental materials. Pollen viability is the main factor which influences the quality and quantity of hybrid chilli seed. In this investigation, five characters viz.,Fruit set %, Fruit length (cm), Fruit girth (cm), Number of seeds per fruit and percentage of germination of hybrid seeds were studied after five days of pollination by storing the pollens under different temperature conditions (0^0C ,4^0C ,17^0C, Ambient condition-27^0C-31^0C) in polytunnel and pollen viability was tested using acetocarmine after storing the pollens under different temperature conditions (0^0C ,4^0C ,17^0C and Ambient condition-27^0C-31^0C) in the laboratory. The results showed that, the highest pollen viability (87.30%), fruit set% (67.96%), fruit length (10.8cm), fruit girth (3.61cm), number of seeds per fruit (51) and germination percentage (90%) were recorded when pollination is carried out by fresh pollen. Furthermore, highest pollen viability (78%), fruit set (65.96%), fruit length (9.83 cm), fruit girth (3.46 cm), number of seeds per fruit (50), and germination percentage (83.93%) were observed even after the fifth day of pollen storage at 0 ^{0}C temperature condition when compared to pollen stored at other storage temperature conditions. This result suggests that either fresh pollen or pollen stored under 0 ^{0}C conditions up to 5 days can be used successfully for hybrid seed production of MICH HY 01. In this experiment, fresh pollen was used to compare the pollen which is stored under different temperature condition. Fresh pollen which is just after dehiscence was reported highest pollen viability and other tested characters. According to literature, viability of pollens do not remain long time and reduce the vigor of pollen with time of the day due to high temperature and also lot of pollens will be wasted in regular hand collection and also time is wasted in commercial pollination procedure due to flower anthesis will occur after 9.30 am that is depend on the day of temperature. Therefore, this result suggests that under the conditions in the experiment 0^0C temperature is the most optimum pollen storage temperature. This finding may be helpful for the farmers who prefer to produce hybrid seeds in commercially to obtain quality and quantity of hybrid seeds by avoiding above adverse factors.

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EFFECT OF DIFFERENT LEVELS OF NITROGENOUS FERTILIZER ON GROWTH AND YIELD OF RADISH

Mr. Uthuma labbai Muhammathu Sahfan

ABSTRACT

An experiment was conducted to study the effect of different levels of nitrogen on growth and yield of radish in the Crop Farm, Faculty of Agriculture, Eastern University, Sri Lanka during the period October to November 2017. Radish variety 'Beeralu' was used for this study. This experiment was laid out in Complete Block Design and consisted of six treatments and five replications. The treatments were T_1 - No fertilizer (Control), T_2–90 kg N/ha, T_3–120 kg N/ha, T_4–180 kg N/ha (Recommended rate), T_5–210 kg N/ha, T_6 – 240 kg N/ha. Agronomic practices were carried out as per Department of Agriculture. Samplings were done at fortnight intervals. At 45 days after planting (DAP), the highest plant height, number of leaves, LAI and diameter of the tuber were recorded in both 210 and 240 kg N/ha. However, application of 210 kg N/ha increased the fresh weight of shoots, total fresh weight of plants, tuber yield per hectare (fresh) and dry weight of tuber/plant. Application of nitrogen increased the tuber weight/ha up to 210 kg N/ha. An increase in nitrogen level from 0 kg N/ha to 210 kg N/ha increased the yield by four folds. A further increase from 210 kg N/ha to 240 kg N/ha decreased yield by 11.5%. The results suggest that yield could be increased by four folds by increasing the nitrogen from 0 to 210 kg N/ha and a further increase in nitrogen will decrease the yield.

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EFFECTS OF GRADED NITROGEN LEVELS ON THE GROWTH AND QUALITY OF *Cordyline fruticosa* var. 'Purple Compacta' IN BATTICALOA DISTRICT

K. Abirami

ABSTRACT

The government of Sri Lanka has identified cordyline (*Cordyline fruticosa* var. 'purple compacta') as one of the priority crop in the floriculture sector, targeting the export market. Cordyline is a popular foliage plant with high demand in the export markets as cut decorative foliage. 'Purple compacta' is a stunning variety of *Cordyline fruticosa* with a compact and miniature growing habit. There are several factors affecting vegetative growth and quality of cordyline plants. Nitrogen has significant effects on vegetative growth and quality of foliage plants. A shade house (50%) experiment was conducted to determine the effects of graded nitrogen levels on vegetative growth and quality of cordyline (*Cordyline fruticosa* var. 'purple compacta') plants in the Crop Farm, Eastern University, Sri Lanka from July 2017 to November 2017. The experiment was arranged in a completely randomized design with twenty replications. Five treatments were defined viz. 0.5(T1), 1.0 (T2), 1.5 (T3), 2.0 (T4) and 2.5 (T5) g nitrogen/plant/month (g/p/m). Phosphorous and Potassium levels were kept constant throughout the experiment. Urea was used as nitrogen source in this experiment. Urea was applied at monthly interval as a split application. Recommended agronomic practices were followed uniformly for all treatments. Parameters viz. plant height, leaf area, plant biomass and leaf nitrogen content were measured at monthly interval and quality of cuttings was assessed at the end of experiment. Analysis of Variance was performed to determine significant difference among treatments ($p < 0.05$). Results revealed that plants belong to T1 (nitrogen level 0.5g/p/m) showed significantly ($p < 0.05$) better performance in the measured growth parameters viz. plant height, leaf area, plant biomass and leaf nitrogen content, while the lowest performance was observed in T5 at 3 MAT. In quality assessment, plants grown at T1 received significantly highest score. From this study, it could be concluded that, plants grown at nitrogen level of 0.5g/p/m (T1) would have been the suitable amount of nitrogen as the growth and quality of plants was higher. A commercial scale evaluation is needed to recommend these findings to floricultural industries.

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INFLUENCE OF DIFFERENT SHADE LEVELS ON THE GROWTH AND QUALITY OF *Codiaeum variegatum* var. 'Bush on Fire' IN THE BATTICALOA DISTRICT

K. Narmhikaa

ABSTRACT

Codiaeum variegatum var. "Bush on fire" is an ornamental foliage shrub with beautifully variegated glossy multi coloured leaves. The vivid shiny variegated leaves adds value for its quality in the export market. Light intensity greatly influences the amount of variegation in these plants. A shade house experiment was carried out to evaluate the effects of graded shade levels on the growth and quality of *Codiaeum variegatum* var. "Bush on fire", in the Batticaloa district during the period of July 2017 to November 2017. The experiment was arranged in completely randomized design with twenty replications. The experimental location was crop farm, Eastern University, Sri Lanka. Graded level of shades were defined as treatments viz. open field (T1), 50% (T2), 60% (T3), 70% (T4), and 80% (T5) of shade levels. Shade houses were constructed using commercial nylon nets of different shade level. Rooted and uniform cuttings were used as planting materials. Agronomic practices were followed uniformly for all treatments. Plant height, leaf area and plant biomass were measured at monthly interval and quality of cuttings was assessed at the end of experiment. Analysis of Variance was performed to determine significant difference among treatments ($p< 0.05$). Plants provided with 50% shading showed significantly ($p<0.05$) better performance in measured growth parameters viz. plant height, plant biomass and biomass partitioning, while the lowest performance was observed in plants grown at 80% (T5) shade level condition. In quality assessment, plants grown at open field (T1) received significantly highest score. Further plants grown at open field showed compactness, better leaf size and increased leaf thickness. From this study it could be concluded that, plants grown at 50% shade level would have received optimum light as the growth of the plants was higher. However, open field condition is suitable for export oriented cultivation of *Codiaeum variegatum* var. **"**Bush on fire" in the Batticaloa district as the quality of the plants was higher.

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EFFECT OF NITRIC OXIDE DONOR SODIUM NITROPRUSSIDE ON GERMINATION DYNAMICS AND SEEDLING ATTRIBUTES OF RUBBER (*Hevea brasilensis*)

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ABSTRACT

Rubber (*Hevea brasilliensis*) is an economically important tropical tree. For producing high quality rubber plants, both rootstock and budwood should be of high quality. Rubber seeds are used to generate rootstock plants. Rubber seeds lose their viability within a few days after falling from the tree and therefore, they are classified as recalcitrant seeds. For government rubber nurseries, seeds are purchased from suppliers who collect and store seeds for few days to weeks before supplying in bulk quantities. These inferior quality seeds require more time to start germination and results in low germination percentage. Nitric oxide (NO) is a signaling molecule which has proved to be involved in biological processes from seed germination up to senescence. Redox priming with Nitric oxide donor Sodium nitroprusside has been shown to increase germination dynamics in crop seeds. The experiment was carried out on exploring the effect of NO donor sodium nitroprusside (SNP), as a chemical priming agent, on germination and storage life of rubber seeds and subsequent growth of seedlings under nursery conditions. Fresh rubber seeds were soaked in SNP solutions at different concentrations viz., 50, 100 and 150 µM for 24 hours and were sown in a germination bed after storing at different time intervals viz., 0, 7, 14, 21 and 28 days respectively. For mock treatment, seeds were soaked in water (hydropriming) and control seeds were devoid of priming treatments. Treatment were arranged in Randomized Complete Block Design (RCBD) with four blocks. No germination was recorded after 28 days of storage irrespective of priming treatments. At zero day of storage, there was no significant difference ($P>0.05$) in germination percentage. However, after the seventh day of storage, a significantly ($P\leq0.05$) higher germination percentage was recorded with SNP at 50 µM (80. 7% and 99.2% after 7 and 14 days of sowing respectively) as compared to control (60% and 75.7% after 7 and 14 days of sowing respectively). At the fourteenth day and twenty-first day of storage, highest significance germination percentage was recorded with SNP at 50 and 100 µM with compared to control and mock treatment (hydropriming) after 21 days of sowing. After one, two and three months from transplanting, plants were sampled to assess the effect of SNP on growth, root architecture and some physiological parameters. At zero day of storage, there was no significance difference in growth and root architecture. At seventh day of storage, significantly ($P\leq0.05$) higher values were recorded for chlorophyll content at 50µmol and 100µmol concentrations with compared to control, after two months of transplanting. Significantly higher stem diameter values were recorded at 50µmol SNP concentration compared to control, after one month of transplanting. After fourteenth day of storage, significantly ($P\leq0.05$) higher values were recorded for chlorophyll content at 50µmol and 100µmol SNP concentrations with compared to control, after two months of transplanting. There was a significant difference ($P\leq0.05$) in numbers of leaves at 50µmol, after one month of transplanting and stem diameter at 100µmol SNP, after one month of transplanting. At twenty one day of storage, there was no significant difference ($P>0.05$) in growth attributes *viz,* stem diameter, shoot height, number of leaves, leaf area, internodal length, chlorophyll content, dry weight of roots and shoots of rubber seedlings after two months from planting. Therefore, NO treatment could effectively be utilized to improve the germination and short-term storage life of rubber seeds to raise high quality budded plants for productivity improvement in rubber industry.

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EFFECT OF MOISTURE ABSORBENT HYDRO POLYMER (ZEBA) ON GROWTH OF COCONUT (*Cocos nucifera* L.) SEEDLINGS IN THE COCONUT NURSERY

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ABSTRACT

Coconut palm is one of the most important plantation crop worldwide. Success of coconut plantation establishment starts with the production of good quality planting materials. Selecting the best planting materials before field planting assures higher productivity. Cost of production of coconut seedling is very high in coconut nurseries, because coir dust is becoming a scarce resource even within the Coconut Triangle. Therefore, the use of coir dust in the potting mixture might not be a feasible proposition in the near future. Therefore it was considered imperative to test the suitability of other options available locally. Moisture absorbent hydro polymer (Zeba) is one the best alternative to the coir dust used in potting media of coconut seedlings. Therefore an experiment was conducted to investigate the effect of moisture absorbent hydro polymer on growth of coconut seedlings and water retention characteristics of the soil. The experiment was carried out under a plant house and laboratory of the Agronomy Division, Coconut Research Institute of Sri Lanka (CRI), Lunuwila. The experiment was laid out in the Complete Randomized Design (CRD) with twelve replicates. Different potting mixtures were used as treatments such as T_1 – top soil: organic manure: coir dust, 1:1:1, T_2 – top soil: organic manure: moisture absorbent compound, 1:1:1, T_3 – top soil: moisture absorbent compound, 1:1, T_4 – top soil: coir dust, 1:1. Measurements were taken and data were statistically analyzed. There was no significant difference ($P>0.05$) among tested treatments in seedling girth and root volume. The results revealed that there were significant ($P<0.05$) differences among the treatments on seedling height, number of fully opened leaves, leaf area, dry shoot weight, dry root weight, soil moisture content and soil water retention capacity. Plant growth rate was increased in T_1. According to the chi square values, there was significant ($P<0.05$) differences among the treatments on number of fully opened leaves at 10^{th} and 12^{th} weeks after planting. T_1 exhibited the highest seedling height, number of fully opened leaves, leaf area, dry shoot weight, dry root weight. Same as the T_1 potting mixture, the T_3 potting mixture also caused to the considerable increase in plant height, number of fully opened leaves, leaf area, dry shoot weight, dry root weight of coconut seedlings while T_3 exhibited highest soil moisture content and water retention capacity also. Therefore application of moisture absorbent hydro polymer could be used to get maximum growth and soil moisture characteristics of coconut seedlings. Then cost of production of coconut seedlings may be reduced.

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