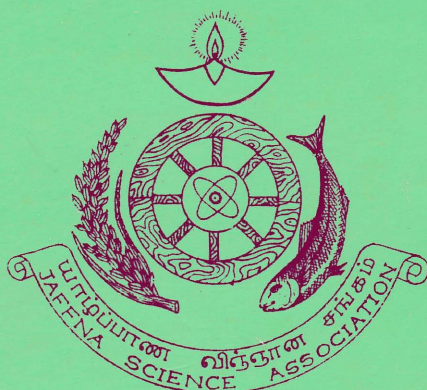


**PROCEEDINGS OF  
JAFFNA SCIENCE ASSOCIATION**

**Abstracts - 2005**

Volume : 12

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13<sup>th</sup> ANNUAL SESSIONS  
6, 7 & 8 April - 2005

**JAFFNA, SRI LANKA  
2005**

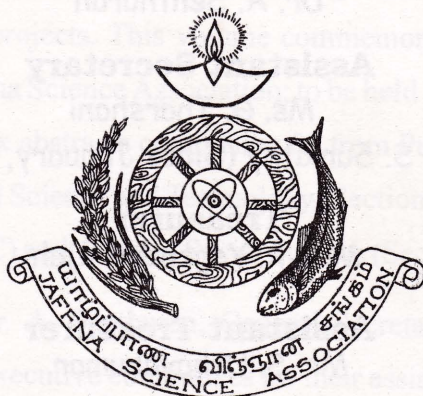


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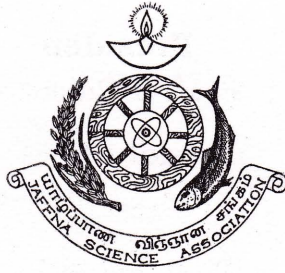
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The Annual Sessions of the Jaffna Science Association held yearly contributes to popularize scientific thinking and encourage scientific research oriented projects. This volume commemorates the 13th Annual sessions of the Jaffna Science Association; to be held from 6 - 8 April 2005. It contains thirty six abstracts comprising 03 from Pure Science (Section - A) 30 from Applied Science and Technology (Section - B) 02 from Medical Science (Section - C) and 01 from Social Science (Section - D).

I wish to thank Dr. A. Senthuran, General Secretary and the Sectional chairpersons and Executive committees for their assistance in getting these abstracts refereed in time for presentation at this annual sessions.

My special thanks are due to Prof. S. Rajadurai; President of Jaffna Science Association and Dr. (Mrs.) S. Sivachandiran, Head, Department of Agronomy for their invaluable assistance in bringing this volume in time.

**Dr. K. Visakaruban,**  
Chief Editor.

**Department of Tamil,**  
**University of Jafna,**  
**Jaffna, Sri Lanka.**  
April 2005.



The Annual Sessions of the Tamil Science Association held yearly contributes to popularize scientific thinking and encourage scientific research oriented projects. This volume commemorates the 13th Annual sessions of the Tamil Science Association, to be held from 6 - 8 April 2003. It contains thirty six abstracts comprising 03 from Pure Science (Section - A) 30 from Applied Science and Technology (Section - B) 02 from Medical Science (Section - C) and 01 from Social Science (Section - D).

I wish to thank Dr. A. Senthil, General Secretary and the Sectional chairpersons and Executive committees for their assistance in getting these abstracts referred in time for presentation at this annual sessions.

My special thanks are due to Prof. S. Rajadurai, President of Tamil Science Association and Dr. (Mrs) S. Sivachandran, Head, Department of Agronomy for their invaluable assistance in bringing this volume in time.

Department of Tamil,  
University of Jaffna,  
Jaffna, Sri Lanka  
April 2003.

Dr. K. Vetharuban,  
Chief Editor.

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## Distribution of Anurans in the Paddy Fields Associated with Ponds, Valikamam Area of the Jaffna Peninsula

Balsubramaniam, A. and Krishnarajah, P.

The present study is to evaluate the anurans found in the paddy fields associated with ponds in Valikamam, - a major division of Jaffna Peninsula. The investigation was carried out from October 2003 to December 2003 at three sites in the monsoonal rainy period. These were paddy fields situated in Uduvil by the side of "Chinna kulam" (site 1), in Chunnakam by the side of "Nochchi kulam" (site 2) and in Mallakam by the side of "Iyanar kulam" (site 3), situated at a distance of 2 km from each other. Samplings were done with the Quadrates of 5m x 5m x 45cm dimension and with the Visual Encounter Survey. Paddy fields, pond banks and adjacent areas were also surveyed from 0530 hrs to 0830 hrs and from 1800 hrs to 1900 hrs. Altogether 10 species anurans were documented and was found to be comprise 60.85% of the family Ranidae, 21.20% of the family Bufonidae and 17.90% of the family Microhylidae. Although a high number of *Hoplobatrachus crassus* was observed in site 1 (34 in number), its occurrence was low in other two sites (9, 8 in no. respectively). While *Microhyla rubra* was dominant in site 3 (37 in number), it was poorly represented in other two stations (1, 6 in number respectively). However *Fejervarya limnocharis* and *Bufo melanostictus* were evenly distributed and were frequently encountered during the study period. A highest anuran diversity (Simpson index  $D = 0.755 - 0.842$ ; Evenness  $J' = 0.793 - 0.867$ ) and the numerical abundance (360) within 3 months period. This study revealed that despite the use of agro-chemicals, high species diversity persists at these man made ecosystems.

The grant RG / 2003 / ZOO / 07 is gratefully acknowledged.

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Department of Zoology, University of Jaffna, Jaffna

## **Allelopathic Effect of whole Plant Leachate of *Cyperus rotundus* (purple nut sedge) on Early Seedling growth of rice, maize, tomato and onion.**

Pararajasegaram.G and Nandakumar. J

*Cyperus rotundus* is a perennial, persistent and deep rooted weed found all over the world. In Sri Lanka, it is found throughout the island affecting yields of crops such as rice, maize, onion, chilli and tomato (Miller, D.A, 1996).

The objective of this study was to study the allelopathic effect of *Cyperus* on germination and early seedling growth of some selected crops, such as rice, maize, onion, and tomato.

Whole plant leachate of *Cyperus rotundus* was used to study the effect on crops rice, maize, onion, and tomato. Six gram of dry *Cyperus rotundus* weed including root, nutlets tubers & inflorescence were collected from the natural strand of weeds. It was surface sterilized and soaked in distilled water at 15<sup>0</sup>C for 72 hours. Filtrate was used to test the germination and early seedling growth of maize, rice, onion and tomato. Shoot and root lengths of seedlings (4day, 8day old) and fresh and dry weights of two weeks old seedlings of these crop plants were measured to determine the allelopathic effect on growth. Controls were also maintained by adding water to seeds instead of *Cyperus* leachate. For each treatment ten replicates were maintained.

Whole plant leachate of weed significantly reduced percentage germination in all the crops tested (rice, maize, onion, and tomato). Whole plant leachate of *Cyprus rotundus* significantly reduced root and shoot lengths of 4 days and 8days old seedlings of crops (rice, maize, onion and tomato). Also it significantly reduced fresh and dry weights of two weeks old seedlings of these crops.

## Conservation of Biodiversity: Study of Some Threatened Plants in Jaffna.

Nahmagal Krishnapillai

Loss of biodiversity is a threatened problem to the ecosystem and human beings. This study was carried out to provide botanical information of threatened plants to the public and scientist, evaluate the biological, social and economic value of those species and to increase the public awareness on conservation of threatened plants. The red data book<sup>1</sup> provides information about the species under higher extinction risk. Ecological survey was carried out to find threatened plants at Thirunelvely and Uduvil area. *Swietenia macrophylla* and *Artocarpus nobilis* were identified at Thirunelvely and *Vanda tessellata* was found at Uduvil. Those species were identified by using morphological characters. Morphological characters used here were height of plant, diameter of trunk, length and breadth of leaf, colour and type of flower, inflorescence and fruit.

All identified plants were not having naturalness. Among those plants only *Artocarpus nobilis* is an endemic plant. All plants have direct economic value such as medicine, timber, firewood and edible purposes. Fruits of *Artocarpus* were edible. *Swietenia* is one of the most valuable furniture timber and it can be used as firewood. *Vanda tessellata* contains a glucoside and used in medical preparations especially in treating arthritis. Because of these economic values, all identified plants were under threatened status.

*Artocarpus nobilis* was rare and other identified plants were occasionally found at that particular place. *Vanda tessellata* is an ecological wonder. It was found as an epiphyte on *Madhuca longifolia*. Soil analysis was done to give a basic idea of the growing medium of above threatened plants. Red colour, friable, non sticky soil with pH 7.16 was found at Thirunelvely area. Public could identify threatened plants by using morphological characters, herbarium and photographs. They should conserve threatened plants by growing them individually or prevent cutting or uprooting of those plants.

### Reference:

- 1) [www.redlist.org/](http://www.redlist.org/) updated 30<sup>th</sup> march, 2004.

## Improving Naringinase Production by *Aspergillus niger* B<sub>1</sub><sup>3</sup>

Senthuran, A., Ketheeswary, N. and Vasanthy, A.

Naringinase is an enzyme which has the property of hydrolysing naringin which gives the bitterness of fruit juices. This study was aimed at the production of naringinase by *Aspergillus niger* B<sub>1</sub><sup>3</sup>. *Aspergillus niger* was cultured in naringin-agar slant, containing (gl<sup>-1</sup>) naringin, 2.0; yeast extract, 1.0; glucose, 5.0; agar, 3.0 and 100ml mineral solution (ZnSO<sub>4</sub>.7H<sub>2</sub>O, 0.7; CuSO<sub>4</sub>. 5H<sub>2</sub>O, 0.7; and FeSO<sub>4</sub>. 7H<sub>2</sub>O, 0.7). On 6<sup>th</sup> day, spores of *Aspergillus niger* B<sub>1</sub><sup>3</sup> were washed with (0.2%, v/v) Tween -80 and 2ml was inoculated to the liquid medium for naringinase production. The liquid medium contained (gl<sup>-1</sup>) naringin, 2.0; glucose, 2.0; soy broth, 20, peptone, 7.0; MgSO<sub>4</sub>.7H<sub>2</sub>O, 0.1; KH<sub>2</sub>PO<sub>4</sub>, 0.5 and 100ml mineral solution at pH 6.0. All the fermentation studies were carried out at 30°C and the enzyme production was determined at 6<sup>th</sup> Day. When the concentration of naringin in the above liquid medium was varied from 1.0 to 6.0gl<sup>-1</sup>, in 2.0 gl<sup>-1</sup> naringinin containing medium highest naringinase activity (1.6Uml<sup>-1</sup>) was obtained. To study the effect of different concentrations of soy broth on naringinase production, the concentration was varied from 0 - 60 gl<sup>-1</sup> while keeping all concentrations of the ingredients same. The enzyme produced was 1.1 and 1.72 U ml<sup>-1</sup> respectively with 0 - 60 gl<sup>-1</sup> soy broth. However in the medium containing 20gl<sup>-1</sup> soy broth highest naringinase activity (1.8Uml<sup>-1</sup>) was obtained. As an alternative to 20gl<sup>-1</sup> soy broth same amount of peptone, yeast extract and corn steep liquor were added to the liquid medium and the naringinase produced was 1.4, 2.02 and 1.74 Uml<sup>-1</sup> respectively. As peptone and corn steep liquor did not increase naringinase production and yeast extract has shown slight increase in the enzyme production different amounts of yeast extract (0-60gl<sup>-1</sup>) was introduced to the liquid medium instead of soy broth. When the concentration of yeast extract was increased from 0 to 60gl<sup>-1</sup>, the naringinase produced was 1.82-1.47 Uml<sup>-1</sup> and the highest amount of enzyme was produced in the medium containing 20gl<sup>-1</sup> yeast extract (2.02Uml<sup>-1</sup>). To the liquid medium which usually contained soy broth (20gl<sup>-1</sup>), 20gl<sup>-1</sup> yeast extract was added, and the enzyme production was increased to 16.54Uml<sup>-1</sup>. When the inoculated medium was mixed at 240 rpm the enzyme production was increased to 28.0 Uml<sup>-1</sup>. Further work is in progress to improve the enzyme production.

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*Department of Biochemistry, Faculty of Medicine, University of Jaffna, Sri Lanka*

## Optimization of Culture Conditions for Protease Production by *Bacillus licheniformis* M27

Kirubaharan, T., Senthuran, A., and Vasanthi, A.

This study was aimed to improve the protease production by *Bacillus licheniformis* M27 (CFTRI, Mysore). The bacterial cells grown in fermentation medium at 42° C (100rpm) produced maximum protease activity ( $5.64 \times 10^5 \text{Uml}^{-1}$ ) at 84h. The fermentation medium contained ( $\text{gl}^{-1}$ )  $(\text{NH}_4)_2\text{SO}_4$ , 2.5; peptone, 2.0; glucose, 9.0;  $\text{Na}_2\text{HPO}_4$ , 8.0;  $\text{KH}_2\text{PO}_4$ , 4.0;  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ , 0.5; and  $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$ , 0.025. Culture conditions were optimized to improve the protease production. The Shaking speed of culture was varied from 75 to 200rpm and the optimum shaking speed was 100 rpm ( $5.64 \times 10^5 \text{Uml}^{-1}$ ). The medium to shake flask volume ratio of 1:10 gave highest protease production ( $5.63 \times 10^5 \text{Um}^{-1}$ ). The strain was cultivated at different temperatures; (37, 42, 50, 55, 60 and 65°C) and growth ( $\text{OD}_{610\text{nm}}$ ) was measured at different time intervals. The highest growth ( $\text{OD}_{610\text{nm}}$  1.788) and protease production ( $5.57 \times 10^5 \text{Uml}^{-1}$ ) were observed at 42°C at 84h respectively. Cultivation pH was varied from 6.0 to 8.0 and optimum pH for enzyme production was 6.75 ( $5.58 \times 10^5 \text{Uml}^{-1}$ ). To optimize the age of the slant used for inoculums preparation, slants containing different aged bacteria (18, 24, 30, 36, 42 and 48h) were used. There was no change in the enzyme production when different aged slants were used for inoculum preparation. Age of the inoculum was varied from 5 to 12h and highest enzyme production ( $5.51 \times 10^5 \text{Uml}^{-1}$ ) was obtained with 8h old inoculum. Size of the inoculum was from 10 to 30% and highest production ( $5.64 \times 10^5 \text{Uml}^{-1}$ ) was obtained with 20% (v/v) inoculum. Further studies are in progress to improve protease production from *Bacillus licheniformis* M27.

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Department of Biochemistry; Faculty of Medicine, University of Jaffna, Sir Lanka

## Increasing $\alpha$ -Amylase Activity of Thermo Stable Enzyme Produced by Strain BR<sub>1</sub>

Senthuran, A., Thayaanathan, K. and Vasanthy, A.

The aim of this work is to increase the  $\alpha$ -amylase production by the strain BR<sub>1</sub>. The organism was inoculated to activation medium containing ((g<sup>l</sup><sup>-1</sup>) soluble starch 2.0, and nutrient broth 25.0) and incubated at 45°C and pH 7.0 (100rpm). At 16h, the temperature was increased to 50°C and incubated for 8 hrs (100rpm). This inoculum (20%;v/v) was transferred to fermentation medium and incubated at 50°C. The fermentation medium contained (g<sup>l</sup><sup>-1</sup>) soluble starch, 2.0; CaCl<sub>2</sub>.2H<sub>2</sub>O, 0.005; MgCl<sub>2</sub>.6H<sub>2</sub>O, 0.005; FeCl<sub>3</sub>, 0.005; K<sub>2</sub>HPO<sub>4</sub>, 2.5; KH<sub>2</sub>PO<sub>4</sub>, 10.0; Peptone 2.0; NaCl, 1.0; (NH<sub>4</sub>) SO<sub>4</sub>, 2.0. At 72h maximum  $\alpha$ -amylase activity (22units) was obtained. When surfactants such as Sodium dodecyl sulphate (0.05% w/v) and Tween 80 (0.1, 1.0 and 5.0% v/v) were added to the fermentation medium,  $\alpha$ -amylase produced was 1.68, 21.22, 18.22 and 18.11units respectively.. Hence there was no significant increase in  $\alpha$ -amylase production when SDS and different concentration of Tween-80 were added to the fermentation medium. To improve  $\alpha$ -amylase production in the fermentation medium, the inducer, succinic acid (0.1 and 0.5g<sup>l</sup><sup>-1</sup>) was added, and the enzyme production was 14.47 and 14.45units respectively at 72h. Therefore succinic acid also did not improve  $\alpha$ -amylase production. In the next set of experiments amount of soluble starch in the fermentation medium was varied in the range of 2-10g<sup>l</sup><sup>-1</sup> while all other contents of the fermentation medium kept the same. The maximum activity of 31 Units was obtained in the medium containing 4.5g<sup>l</sup><sup>-1</sup> soluble starch. Then to the fermentation medium containing 4.5g<sup>l</sup><sup>-1</sup> soluble starch different amount of sesame oil (2.25, 4.5, 9.0, 18.0, 22.5 & 27.0ml<sup>l</sup><sup>-1</sup>) was introduced.  $\alpha$ -amylase production was increased to 64.9 units in the medium containing 18ml<sup>l</sup><sup>-1</sup> sesame oil. Coconut oil (3.0ml<sup>l</sup><sup>-1</sup>) completely stopped  $\alpha$ -amylase production. In the fermentation medium containing 4.5g<sup>l</sup><sup>-1</sup> soluble starch and 18.0ml<sup>l</sup><sup>-1</sup> sesame oil, 65 units of  $\alpha$ -amylase activity was obtained, which is 3 times more than that obtained in fermentation medium. Further experiments are in progress to increase the  $\alpha$ -amylase production.

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*Department of Biochemistry, Faculty of Medicine, University of Jaffna, Sri Lanka*



## Effect of Different Nitrogen Sources on $\alpha$ -amylase Production from *Bacillus licheniformis* ATCC 6346

Vengadaramana, A., Balakumar, S. and Vasanthi, A.

The effect of different nitrogen sources on thermo-stable  $\alpha$ -amylase production by *Bacillus licheniformis* ATCC 6346 was investigated. Single colony of *Bacillus licheniformis* ATCC 6346 from nutrient agar slants (grown at 37°C for 24h) was transferred to activation medium and incubated at different temperatures varied from 37°C to 65°C in a rotary shaker (100rpm). There was no growth observed at 60°C and above. The bacteria, incubated in activation medium at 42°C for 12h, was used as inoculum. The nutrient agar medium contained (g l<sup>-1</sup>) nutrient agar, 25.0 and soluble starch, 3.0 and the activation medium contained (g l<sup>-1</sup>) nutrient broth, 25.0 and soluble starch, 3.0. The fermentation medium was inoculated with inoculum (20%, v/v) and incubated at 42°C and 100rpm. The fermentation medium contained (g l<sup>-1</sup>) soluble starch, 4.0; (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, 5.0; peptone, 6.0; FeCl<sub>3</sub>, 0.01; MgCl<sub>2</sub>.6H<sub>2</sub>O, 0.01; CaCl<sub>2</sub>.2H<sub>2</sub>O, 0.01; KH<sub>2</sub>PO<sub>4</sub>, 4.0 and K<sub>2</sub>HPO<sub>4</sub>, 7.5. The strain *B.licheniformis* ATCC 6346 reached log phase at 12h. Highest growth (OD<sub>600nm</sub>, 1.895) was obtained at 12h and the highest  $\alpha$ -amylase activity (44.43Uml<sup>-1</sup>) was obtained at 48h. The peptone (6g l<sup>-1</sup>) in the medium was replaced by same amount of Tryptone, Yeast extract, and oil containing oil seed cakes such as sesamum, mustard, ground nut, coconut and soy meat while all other contents of the fermentation medium were kept the same. The highest  $\alpha$ -amylase activity (52.27Uml<sup>-1</sup>) was produced in the medium containing soy meat after 48 h of fermentation and negligible amount of enzyme activity (0.691Uml<sup>-1</sup>) was obtained in the medium containing coconut oil seed cake. Completely oil removed oil seed cakes (in the range of 2-30 g l<sup>-1</sup>) such as sesamum, mustard, ground nut and soy meat were used to improve the  $\alpha$ -amylase production. Maximum  $\alpha$ -amylase activity was obtained in the media containing groundnut 39.36Uml<sup>-1</sup> (14g l<sup>-1</sup>), soy meat 44.62Uml<sup>-1</sup> (18g l<sup>-1</sup>), mustard 58.14Uml<sup>-1</sup> (18g l<sup>-1</sup>), and sesamum 56.64Uml<sup>-1</sup> (18g l<sup>-1</sup>) at 48h of fermentation. 6g l<sup>-1</sup> of completely oil removed oil seed cakes such as groundnut (34.42Uml<sup>-1</sup>), mustard (46.01Uml<sup>-1</sup>) and sesamum (46.79Uml<sup>-1</sup>) gave higher enzyme production than oil containing oil seed cakes where the enzyme production was decreased in presence of soy meat (41.75Uml<sup>-1</sup>).

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**Purification of naringinase produced by *aspergillus niger* B<sub>1</sub><sup>3</sup>**

Senthuran, A., Ketheeswary, N., and Vasanthy, A.

Naringinase has found wide application in debittering of grapefruit juices and pulps. This study was aimed at the purification of naringinase produced by *Aspergillus niger* B<sub>1</sub><sup>3</sup>. *Aspergillus niger* was cultured in the liquid medium containing (g l<sup>-1</sup>) naringin, 2.0; glucose, 2.0; soy broth, 20, yeast extract, 20.0; MgSO<sub>4</sub>.7H<sub>2</sub>O, 0.1; KH<sub>2</sub>PO<sub>4</sub>, 0.5 and 100ml mineral solution (ZnSO<sub>4</sub>.7H<sub>2</sub>O, 0.7, CuSO<sub>4</sub>.5H<sub>2</sub>O, 0.7 and FeSO<sub>4</sub>.7H<sub>2</sub>O, 0.7). The organism produced the highest naringinase activity (28Uml<sup>-1</sup>) on 6<sup>th</sup> day at 30°C. The crude enzyme contained 28 Uml<sup>-1</sup> naringinase activity and 23.22mgml<sup>-1</sup> protein. To purify the enzyme it was subjected to fractional precipitation by adding solid (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> to 40, 60 and 80% saturation. The activities found in the fractional precipitates were 28.84, 54.96 and 14.75 Uml<sup>-1</sup> respectively. Hence for the purification studies the enzyme was precipitated with 60% saturation of (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. The precipitate was dissolved in 50mM phosphate buffer (pH 7.0) and dialysed against the same buffer. The residue contained naringinase activity of 87.64 U ml<sup>-1</sup> and 18.46 mg ml<sup>-1</sup> protein. The dialyzed enzyme was added to ion-exchange (DEAE-Sepharose™ CL-6B) column (11.5 x 2cm) and equilibrated with 50mM phosphate buffer (pH 7.0). The enzyme was eluted with the same buffer containing 0.5M - 1M NaCl. The purified enzyme sample contained 35.3 U ml<sup>-1</sup> enzyme activity and 2.45mg ml<sup>-1</sup> protein content. In another experiment the (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> precipitated enzyme was dialysed against 50mM phosphate buffer (pH 7.0) containing 1.5M (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. The dialyzed enzyme was loaded into Phenyl-Sepharose™ 6 Fast flow column (11.5 x 2cm) and equilibrated with 50mM phosphate buffer (pH 7.0) containing 1.5M (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>. The adsorbed enzyme was eluted with 50mM phosphate buffer (pH 7.0). The purified enzyme showed 83.21Units ml<sup>-1</sup> enzyme activity and had 6.15mg ml<sup>-1</sup> protein. The recovery of naringinase by ion-exchange and hydrophobic interaction chromatographies were 81 and 98% respectively showing the specific activity of 13.9 and 12.12 Ug<sup>-1</sup> protein respectively.

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The enzyme samples purified by ion-exchange chromatography and hydrophobic interaction chromatography were separated by SDS-polyacrylamide gel electrophoresis. The electrophorogram gave two clear bands. To confirm that the two bands are of that of naringinase, purified enzyme sample was mixed with naringin ( $2\text{gl}^{-1}$ ) at pH 5.0 and incubated for 0 to 120 min at pH 5.0 and  $50^{\circ}\text{C}$ . The products were analyzed by thin layer chromatography. The chromatogram of the hydrolysate of naringin by the purified enzyme showed bands parallel to the positions of naringin, prunin, rhamnose, naringenin and glucose. Further studies are in progress to improve the purification of naringinase.

## Influence of Metal Ions on Activity and Stability of $\alpha$ -amylase from *Bacillus licheniformis* ATCC 6346

Vengadaramana, A., Balakumar, S. and Vasanthi, A.

Effect of different metal ions on the activity and stability of  $\alpha$ -amylase produced by *Bacillus licheniformis* ATCC 6346 was investigated. Here 2mM of  $Mn^{2+}$ ,  $Na^+$ ,  $Ca^{2+}$ ,  $Hg^{2+}$ ,  $Mg^{2+}$ ,  $Ba^{2+}$  and  $Cu^{2+}$  and 0.5mM Ethylenediaminetetra-acetic acid were used. Before commencing the studies the enzyme from the spent medium was precipitated with 50% ammonium sulphate and dialyzed against distilled water. This dialysis was carried out at 20°C for 48h.  $\alpha$ -Amylase activity was strongly inhibited by 2mM  $Cu^{2+}$ ,  $Hg^{2+}$ ,  $Mn^{2+}$  and 0.5mM Ethylenediaminetetra-acetic acid but less affected by 2mM  $Mg^{2+}$  and  $Ba^{2+}$ . 2mM  $Ca^{2+}$  and  $Na^+$  stimulated the enzyme activity at 85°C and at pH 7.0. Effect of NaCl on the stability of  $\alpha$ -amylase was studied. The enzyme was pre incubated with different concentrations of NaCl (0 to 0.4M) and 21% and 1.0% of initial activities were retained with 0.4M and without NaCl respectively at 60min of pre-incubation at 85°C and pH 7.0. However maximum activity was retained with 0.1M NaCl (33% of initial activity) at 60min incubation at 85°C and pH 7.0. In 0.1M NaCl 100% of initial enzyme activity was retained for 150min and 70min of pre-incubation at 60°C and 70°C respectively and at 80°C, 88.20% of its initial activity was retained at 60min of pre-incubation at pH 7.0. The effect of  $Ca^{2+}$  on the stability of the enzyme was studied. The enzyme was pre-incubated with different concentration of  $Ca^{2+}$  (0 to 1mM). In presence of 1mM  $Ca^{2+}$ , 100% of initial activity was retained at 60min of pre-incubation at 85°C and at pH 7.0. The effect of  $Ca^+$  and  $Na^+$  combination on the stability of  $\alpha$ -amylase was studied. With 1mM  $Ca^{2+}$  and 0.1M NaCl, 17.3% of its initial activity was retained at 180min of pre incubation at 95°C and at pH 7.0 but the enzyme with 1mM  $Ca^{2+}$  and 0.1M NaCl separately, lost total activity at 120 and 90min respectively. Protein denaturants, such as Sodiumdodecylsulphate (10mM), decreased the enzyme activity; in contrast, urea (10mM) had no influence on enzyme activity. The enzyme in 0.1 and 0.5M NaCl showed 104 and 74.7% of the original activity respectively at 24h of incubation at 6°C and pH 7.0.

## A Comparative Study of Different Methods for Improved Quality Sweet Toddy

Rajadurai, S., <sup>1</sup>Mageswaran, R., Srikanan, R., Senthilnathanan, M. and Jeyadevan, J. P.

Palmyrah sweet toddy is a colourless, sweet and nutritious natural drink with slight bitter taste. Different methods are used to collect the sweet toddy by inhibiting the microbial growth. Attempts made to bottle and market the sweet toddy in the name of "Pathaneer" were not popular due to its limish taste. Out of the different methods used to reduce the limish taste of Pathaneer, addition of triple super phosphate solution at 40-50°C is the most common one. Even though this method gives a clear liquid, it did not improve taste satisfactorily. The consumption of sweet toddy treated with triple super phosphate solution has a toxic effect in human beings and also it reduces the nutritious value of "Pathaneer" too. A suitable nontoxic method, without losing any nutrients to prepare "Pathaneer" is presented here.

Palmyrah sweet toddy was collected from randomly selected palms in the Jaffna district. Then the sugar, alcohol content, total cell, viable cell and pH were measured with varied amounts of coated slaked lime and the minimum amount of slaked lime (5.99g/L) required was determined. The excess of  $\text{Ca(OH)}_2$  was removed by treating the toddy sample with the exact amount of  $\text{CO}_2$ . The "Pathaneer" obtained *via* this method was found to possess all the nutritious value. In addition, this method is non-toxic, easy to handle and less expensive.

## A comparative study of bioactivity of Palmyrah fruit pulp from different palm varieties in Jaffna district

Ragusuthan, P., <sup>1</sup>Mageswaran, R., Senthilnathanan, M., Srikanan, R. and Jeyadevan, J. P.

Palmyrah (*Borassus flabellifer*) is a common palm growing in the arid zones of Sri Lanka. Fruit pulp of Palmyrah is consumed by human in some Asian countries including Sri Lanka, particularly in Jaffna peninsula. However, the presence of some bitter principles, identified as steroidal saponins (flabelliferins), in these fruit pulps prevents their utilization in food industry.

Palmyrah has many morphologically distinct fruit types. It has been reported<sup>1</sup> that there is a large variation in the types of flabelliferins profile in the fruit pulp of different Palmyrah fruit types. Two different Palm varieties bearing black-skinned and red-skinned fruits have been identified in Jaffna peninsula. The Palm trees bearing black-skinned fruits are the most abundant. Flabelliferin II, Flabelliferin B, Flabelliferin C and Flabelliferin D were isolated from both kinds of fruit pulps. Flabelliferin II is a tetraglycoside; Flabelliferin B is a triglycoside having antimicrobial activity; Flabelliferin C is also a triglycoside but non-bioactive; Flabelliferin D is a diglycoside and non-bioactive. The fruit pulp of the red-skinned fruit was found to contain more of the bitter tetraglycoside flabelliferin II and bioactive Flabelliferin B.

The antibacterial activity of the extracts of both kinds of Palmyrah fruit pulps against four different bacterial strains, namely *Acinetobacter sp.*, *Escherichia coli*, *Staphylococcus aureus* and *Proteus sp.*, was also studied. The red-skinned fruit pulp was found to be more active than the black-skinned fruit pulp against all bacterial strains studied. In general, 70 – 98% and 33 – 57% bacterial growth inhibitions were observed for the red-skinned and black-skinned Palmyrah fruit pulps respectively. This may be due to the presence of high flabelliferin B content in the red-skinned Palmyrah fruit pulp.

The chemical constituents of Palmyrah fruit pulps, obtained from the two varieties, were also compared. There is only slight variation in the amounts of inorganic elements such as calcium (780ppm - 1014ppm), magnesium (596ppm - 730ppm), iron (20ppm - 25ppm) and phosphorus (778ppm - 1034ppm) present in these two varieties.

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## Study on Physicochemical Properties of Bottled Palmyrah Fruit Pulp and Treacle

Vasantharuba.S

Bottling of palmyrah fruit pulp and treacle is carried out to reduce the wastage during peak season and increase the availability through out the year. But the physicochemical properties of these bottled products and their changes during storage are not studied in detail. The main objective of this experiment is to study the different physical and chemical properties of bottled fruit pulp and treacle. Three months old preserved palmyrah fruit pulp and treacle packed in airtight plastic bottles were used as samples for this experiment. Bottled treacle contained (%) moisture 21.60, ash 1.73, fat 3.66, protein 0.65 and total dietary fiber 0.49. At the same time bottled fruit pulp have (%) moisture 81.71, ash 0.98, fat 0.39, protein 0.42 and total dietary fiber 2.68. These results showed that the fruit pulp is a better source of total dietary fiber than treacle. Total soluble solids of the treacle and fruit pulp are shown as 73 and 16<sup>o</sup> Brix respectively. Sucrose is the major type of sugar for both treacle (43.80g/100ml) and fruit pulp (7.25g/100ml) samples. Fructose (3.45g/100 ml for pulp and 11.21g/100ml for treacle) and glucose (3.16g/100ml for pulp and 9.67g/100ml for treacle) are the other major types of sugars found in these samples. The pH of the bottled fruit pulp (4.42) is lower than that of treacle (5.16). The % acidity of the fruit pulp (0.40) is also higher than that of treacle (0.17). Water activity of the fruit pulp (0.98) is very high when compare to treacle (0.70). The CIELAB method of colour measurement was used to quantify the surface colour of the treacle and fruit pulp. The colour values for treacle is L (24.49), a (1.28), b (1.07) while the fruit pulp having values of L (37.55), a (12.35), b (16.85). The L value showed the degree of lightness, which means fruit pulp, is lighter than treacle. The higher a and b value showed that fruit pulp is more reddish and yellowish than treacle.

## A Preliminary Study on Population dynamics of Weeds in Paddy fields and Control methods in Eastern Region of Sri Lanka.

Arulmageswaran, S., Thineshkanthi, A. and Chandrasiri, N.M.I.

Rice is the leading cereal crop in the world. It is the staple food crop in many developing countries including Sri Lanka. This study was carried out in Batticaloa district from September 2003 to August 2004 during *Maha* (2003/04) and *Yala* 2004. The objectives of this study were to assess the major weed species, population dynamics and control methods employed by farmers in Batticaloa district of Sri Lanka, comes under Low Country Dry zone (DL<sub>3</sub>). Both field survey by administering questionnaire and direct assessment of weed population at different situations were carried out. It has been found from study that there were 16 major weed species found in the study area. The weed infestation was severe in upland condition than lowland because of frequent wetting and drying in upland, and prevailing underground survival organs favored growth of weeds. The number of weeds per square meter in upland, lowland and irrigated field were 68, 53 and 21 respectively. Most of the farmers (68%) irrespective of season have used chemicals to control weeds, and hand weeding accounts for 17 percent of total population. Water management towards weed control was efficient method, accounts for about 6 percent of population. The farmers in the study area used more than one weedicide and have experience of mixing two different weedicides, accounts for 12 percent of population. Mixing 2-3 drops of Paraquat with Propanil and Propanil with MCPA were the most common tank mixture adopted by these farmers group. The level of weed control was assessed and the values range from 0 to 3 represents non adopters, low, medium and high level of adaptation. The level of adaptation of weed control practices were lower in *Maha* season (1.47) and in *Yala* season mean score (2.01) indicate medium level of adaptation to compete with these biological constrain.



**Evaluation of The “Boom Flower-N”, A Flowering Stimulant on Growth Parameters and Yield of Okra (*Abelmoschus esculentus*), Tomato (*Lycopersicon esculentum*) and Brinjal (*Solanum melongena*)**

Thillainathan, K. and Sivachandran, S.

Okra, Tomato and Brinjal are important vegetables in Sri Lanka. These are also main vegetables in Jaffna. They are widely cultivated in both Maha and Yala season, with improved varieties and yield improving technologies. Yield increase is not substantial. Application of foliar nutrients, hormones and chemicals reported to increase the demand and profit of these crops. A field experiment was conducted at Seed-CO farm during November 2003 to evaluate the effect of “Boom flower-N”, a flowering stimulant on growth and yield characters of Okra, Tomato and Brinjal. Okra, Variety Thirunelvely white, Tomato, variety KC-1 and Brinjal, variety Thirunelvely purple were used in this experiment. For each crop, an experiment with four treatments was carried out in Randomized Complete Block Design (RCBD) with four replicates. All agronomic practices were performed as per recommendation made by Department of Agriculture. Treatments include three concentrations of “Boom flower-N”, 1ml, 2ml and 3ml per litre of water and water spray as check applied three times at 20 days interval. First application of “Boom flower-N” was done when the plant reached end of vegetative phase. Records on plant height, branches per plant, flowering clusters per plant, number of flowers per cluster, total flower numbers per plant and number of dropped flowers per plant were taken at four days interval. Mean fruit weight; mean fruit length, mean fruit girth, number of fruits per plant, yield per plant and yield per plot were taken at the end of every harvest. Experiment results revealed that, “Boom flower-N” application significantly increased plant height, cumulative branch number per plant, total flower number and fruit number per plant. Fruit characters like mean fruit length, mean fruit weight, yield per plant and yield per plot were also significantly increased with the application of “Boom flower-N”. Total number of fruit increased 20% in Okra, 60% in Tomato and 55% in Brinjal by 2ml “Boom flower-N” application. This maximum difference was observed in 2ml per liter of water application. This trend was same for all the three crops. But, number of flowers dropped was not significantly affected by this chemical application. Similarly fruit girth was also not affected significantly. Total yield was increased 70% in Tomato, 37% in Okra and 34% in Brinjal with application of “Boom flower-N” at 2ml per litre concentration. . At the same time, visual observation indicates disease incidence and pest attack were low in treated plants and were healthy and fleshy compared to untreated plants.

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## Suitability of Protected Agriculture for Cultivating Tomato in Dry Zone with Different Fertilizer Management

Shakila Chrishanthi, J. and Sivachandran, S.

Protected agriculture is one of many remedies for environmental problems of crop cultivation. An experiment was conducted during December 2003/ March 2004 to study the effect of shading net and fertilizer treatment on plant growth parameters, yield and incidence of pest and disease in tomato. A two factor factorial experiment was carried out in split plot design. Factor one is shade with three levels as top cover, full cover and open field. Factor two is fertilizer treatment with sole organic, combination of organic and inorganic and sole inorganic fertilizer. Seedlings were transplanted in pots at the spacing of 50 cm x 50 cm. Growth parameters, yield and incidence of pest and disease were recorded.

The results revealed, there was no significant difference by fertilizer treatments or interaction between both treatments. Growth parameters, highest main stem height (75.88 cm), number of cumulative (28), and active leaves (21) on main stem and total leaf area (7914 cm<sup>2</sup>) were obtained in full cover, followed by top cover and open condition. Primary branch number was high (5) in open, medium (3) in top, and low (2) in full cover. Shade didn't have any effect on aerial dry weight. Flowering and flower dropping was high in full and top cover than open condition. Fruit setting was high in open condition. Yield parameters, weight and number of fruits harvested was not affected by shade treatment. Incidence of pest and disease, except leaf minor, other insect damages were low in full cover. Within top cover and open condition severity of insect and disease damages was same. Incidence of late blight disease was not observed under full cover. Chemical sprays were significantly reduced by 75% under full cover.

Though the yield was not significantly increased by shade treatments, the incidence of pest and diseases was at significantly low level under full cover, resulting in drastic reduction in the use of agro-chemicals. Combination of organic and inorganic fertilizer had increased influence on growth and yield parameters. Hence use of full net cover is recommended for organic farming.

## Evaluation of the Efficacy of Cattle Manure and Inorganic Fertilizer on Growth and Development of Hybrid Maize.

Arulmageswaran.S., H.T.N.Dharmapala and Chandrasiri.N.M.I.

A field experiment was conducted to evaluate the efficacy of cattle manure with recommended inorganic fertilizer at Sri Lanka school of Agriculture, kundasale, comes under Intermediate zone (IM<sub>3</sub>) of Sri Lanka. The experiment was conducted during *Yala* season from May to September 2004. This experiment was designed in Randomized Complete Block Design (RCBD) with four replicates. The variety used in this experiment was a hybrid named "Passific" and the reason was that the hybrid varieties generally performed in better way and give good yield compared to that of inbred lines. The treatments included four level of well decomposed cattle manure (10, 20, 30 T/ha) and recommended level of inorganic fertilizer by the Department of Agriculture. Altogether there were five treatments in addition to control. The results showed that average cob weight, cob length, number of seeds per cob, leaf area per plant and plant height were significantly different among treatment at  $p=0.05$ . The inorganic fertilizer application as recommended by the Department of Agriculture gave higher response compared to organic fertilizer used at different rates. It induced growth and development of maize early and produced heavier cobs in terms of average cob weight, length and number of seeds per cob. The application of well rotted cattle manure at the rate of 50t/ha increased the yield compared to the rates of 10, 20 and 30 T/ha. The height measurements at two weeks interval showed that rapid increased were observed 5 weeks after planting and continued to grow up to 8 weeks and there after no height increase were recorded. When consider health and environmental condition, organic fertilizer are good and increased yield level but not as by inorganic fertilizer.

## Occurrence of Citrus Variegated Chlorosis in Citrus Varieties

<sup>1</sup>Gnanakumaran.S and <sup>2</sup>Indra Ariyaratne

*Xylella fastidiosa*, is a bacterium reported to cause the disease, citrus variegated chlorosis (CVC). The disease has been identified first in citrus at fruit orchard of Horticultural crop Research and Development Institute (HORDI), Gannoruwa. An attempt was made to confirm the incidence of *X. fastidiosa* in citrus plants and to evaluate this varietal resistance against this pathogen.

Fourteen citrus varieties such as Bibile sweet orange, Valencia sweet orange, Arogya sweet orange, Mandarin local, Mandarin Madhu, Pummelo local, Charlet's red pummelo, Australian orange, Tangelo, Grape fruit, Heen naran, Tahiti lime, Lime local and Calamency were screened for disease incidence at HORDI. First flush leaves from five plants were collected in each variety from the orchard of HORDI in Kandy. The scissors were sterilized with 40% alcohol in between the collection of two samples. The samples were weighed (0.5g) and ground. The enzyme-linked immunosorbent assay (ELISA) was done for the extracted samples. The ELISA plate readings were taken by ELISA reader with 492nm filter, and ELISA procedures were completed. The taken ELISA titer readings were analysed by cluster analysis.

*X. fastidiosa* infected plants showed prominent vein clearing and chlorosis symptoms. The cut off ELISA titer value was 0.123. Three clusters were identified. The first cluster had citrus varieties Mandarin local (0.170), Bibile sweet orange (0.124), Calamency (0.159), Australian orange (0.154) and Heen naran (0.123) which showed moderate susceptibility reaction to *X. fastidiosa*. Tahiti (0.173) had classified as second cluster that showed high susceptibility. Arogya sweet orange (0.089), Valencia sweet orange (0.079), Lime local (0.084), Madhu (0.105), Charlet's red Pummelo (0.087), Pummelo local (0.091), Grape fruit (0.062) and Tangelo (0.101) were third cluster that showed resistant reaction for *X. fastidiosa* infection

Calamency variety showed a quick recovery from CVC. When the infected plants of calamency were reevaluated, some of them were recovered. The immunity developed in the calamency variety would be the reason for the recovery. But when first infected, the CVC was very severe with very prominent symptoms in citrus.

Among the varieties tested, six namely Tahiti, Mandarin, Bibile sweet orange, Calamency, Australian orange and Heen naran were infected by *X. fastidiosa*. This is the first report to confirm the incidence of CVC by *X. fastidiosa* in Sri Lanka.

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## Characterization of Tea Germplasm Using Reproductive Traits

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Morphological and molecular characterization of genetic resource were identified as widely important factors to be utilized in plant breeding program of any crop. Characterizations were carried out using 51 Tea accessions conserved in ex-situ gene bank at Tea Research Institute of Sri Lanka with the objective of identifying the most distinguishing reproductive traits or characters in tea accessions. In order to identify the desirable morphological traits, 15 flower traits and 8 fruit traits, were scored from randomly selected tea bushes. Plant materials were collected from free growing plants and characterization was carried out according to IPGRI tea descriptors. Collected primary data were subjected for statistical data analysis using SAS package.

Selected accessions were significantly clustered in to three major groups. Splitting of style, ovary type, corolla colour, relative height between androecium and gynoecium, ovary pubescence, number of petals and nature of style splitting were the distinguishable floral characters whereas fruit diameter, seed weight, seed diameter, fruit weight, number of seed per fruit and number of carpels per fruit, were distinguished as fruit characters.

Positive correlations were obtained between fruit weight and seed diameter, fruit diameter with seed diameter, seed weight with seed diameter. Therefore these characters can be considered as discriminating parameters for categorizing tea cultivars by using reproductive traits.

Splitting of style was a criteria that represented the number of locules in the ovary. Number of locules in the ovary showed significant relationship with the number of seeds and carpel of the fruits. Number of seeds per fruits showed negative relationship with seed weight and seed diameter. Seed weight and diameter of seeds were reported to affect germination of the seeds. From the number of splitting of style, it is possible to select maternal parent of the resultant progeny for tea breeding program in order to obtain high germination percentage. This result might have importance to increase the success of the hybridization program by improving the resource utility in all aspects.

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## Incompatibility of Systemic Insecticide Imidacloprid with *Trichoderma viridae*

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The antagonistic fungus, *Trichoderma viridae* has been extensively used to control soil born plant pathogenic fungi in Karnataka, India. The combination of an insecticide with an antagonistic fungus would result to an additive effect by way of synergism or antagonism for an effective management of insect pests and diseases of chilli.

A laboratory study was conducted to understand the effect of a systemic insecticide, Imidacloprid belonging to chloronicotinyl group on growth of *T. viridae*, which could be a possible combination in IPM programme for the management of insect pests and diseases in chilli. The food poison technique was followed in this experiment. Potato Dextrose Agar (PDA) medium was amended with imidacloprid to get 0.5, 0.75, 1.00 and 1.25 per cent concentration and mixed thoroughly under aseptic condition. The control was maintained without addition of imidacloprid. A five millimeter circular disc of five-days old *T. viridae* was transferred aseptically to the center of Petri plate and the plates were incubated at  $25\pm 2^{\circ}\text{C}$  for 21 days. The per cent inhibition of colony growth over control was calculated at 7, 14 and 21 days after inoculation.

There was a significant variation in inhibition of *T. viridae* among the different concentrations of imidacloprid at 7, 14 and 21 days after inoculation. Inhibitory effect of imidacloprid showed decreasing trend from 7 to 21 days after treatment. The per cent inhibition significantly increased with increase in concentration of imidacloprid and decreased with increase in duration (days). Maximum inhibition of *T. viridae* was 76.17% at the concentration of 1.25% imidacloprid at seven days after inoculation. The minimum inhibition of *T. viridae* was 11.74% at 0.25% concentration of imidacloprid at 21 days after treatment.

The results clearly indicated that the inhibition on the colony growth of *T. viridae* was increased as the concentration of imidacloprid increased from 0.25 to 1.25 per cent. The inhibitory effect of imidacloprid at lower concentration on the growth of *T. viridae* was an indication that the antagonistic fungi used as seed or seedling treatment should not be applied together with imidacloprid.

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## Screening of Tomato Accessions Resistance for Bacterial Wilt Caused by *Ralstonia solanacearum*

Gnanaraja.T and Indra Ariyaratne

Bacterial wilt of solanaceous crops caused by *Ralstonia solanacearum* is predominant throughout the world. It infects more than fifty different plant species.

Three races such as 1,3 and 4 and three biovars namely II, III and IV of *R. solanacearum* were reported to cause bacterial wilt in Sri Lanka. Economic losses due to bacterial wilt are greater for tomato and brinjal than in any other crops, almost total loss frequently occurred. It is an "Ecologically competent" pathogen, and due to this nature control of this by physical, chemical, cultural and biological methods were not effective. Host resistance is the only effective and economical method of combating this disease. It is necessary to screen accessions of these crops for selection of inherent resistance in existing or old varieties, wild forms of the same species and closely related species.

Eighteen tomato accessions were evaluated to assess their potential for resistance to *R. solanacearum* under green house conditions at HORDI, Gannoruwa from October 2002 to February 2003 by using split-plot design with inoculation method as main plot factor and accessions as the sub plot factor with three replicates and 540 plants included in each replicate.

The test plants were inoculated one month after planting when they were at five-leaf stage using ST<sub>14</sub> isolates of *R. solanacearum*. Bacterial inocula were prepared using one-day-old culture grown on Sucrose Peptone Agar media. Ten milliliters of bacterial suspension was injected in to the stem of each test plant. After inoculation, soil moisture was maintained at saturation level and temperature was maintained at 32 - 37 °C in the screen house.

The treated plants were observed and bacterial wilt symptoms were recorded daily and disease index ( $DI = \frac{\sum ni \times i}{N \times imax}$ ),  $i = 0-5$ ,  $imax=5$ ,  $n$ =no. of plants,  $N$ =total number of plants ) were calculated.

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Seven tomato accessions showed resistance HT-AV-8 (*L.esculentum*)( DI= 0), 5-14-60 (*L.esculentum*) (DI= 0), M-121(DI= 0) (*L.esculentum*), T-245(*L.esculentum*) (DI= 4.67), HT-AV-1314 (*L.esculentum*) (DI= 5.3), L00687 (*L.peruvianum*)(DI= 6.00), and KC1(*L.esculentum*) (DI= 6.1), resistant to the bacterial wilt disease (CV=9.69, LSD= 1.89).

M-127 (*L.esculentum*) (DI= 10.28), HT-AV-2123 (*L.esculentum*) (DI= 19.34), M-120 (*L.esculentum*) (DI= 10.74), BIGBEEF (*L.esculentum*) (DI= 13.34), L00139 (*L.pimpinellifolium*) (DI= 17.2) and 44-4-2 (*L.esculentum*) (DI= 19.25) were found moderately resistant to *R. solanacearum*.

L00645 (*L.peruvianum*) (DI= 22.73), Mission 102 (*L.esculentum*) (DI= 26.76), L00643 (*L.peruvianum*) (DI= 30.00), L00669 (*L.peruvianum*) (DI= 33.34) were moderately susceptible and, L 04253 (*L.cheesmanii*)(DI= 41.67), was highly susceptible to the disease.

These selected resistant accessions can be used in the hybridization programs to produce bacterial wilt resistant varieties with commercially acceptable characters including high yield.



## Use of Wild Tomato Germplasm in Genetic Improvement of Tomato

<sup>1</sup>Thuraisingam.T and <sup>2</sup>Ranjani Pieris

Genetic resource is very essential for any crop improvement work, as it is the basis of genetic variability. Tomato (*Lycopersicon esculentum* Mill.) is one of the most important vegetable crops cultivated in Sri Lanka. In recent years, the demands for tomato increased and at present people are much concerned about the fruit quality characters with the yield and pest resistance. But it has been identified that the wild tomato germplasm which is the rich source of donor for these characters. Therefore, this study was initiated to utilize the wild germplasm in hybridization programmes.

Experiment was carried in the field of Horticultural Research and Development institute during maha season 2004. For the hybridization testing lines of wild accessions LO0139, LO0140

(*L. pimpinellifolium*), LO4253 (*L. cheesmanii*), LO0687, LO0669 (*L. peruvianum*), LO0645, LO1064, LO1065 (*L. hirsutum*) and cultivated types (T-245 and Rajitha) were planted in observational plots. The pollens of all test wild accessions were hybridized with *esculentum* species. But the pollens of *L. hirsutum* and *L. peruvianum* species were irradiated with 3kr gamma rays and crossed with *esculentum* species; T-245 and Rajitha.

Accessions of *L. pimpinellifolium*(LO0139, LO0140) and *L. cheesmanii* (LO4253) were easily crossed to *L. esculentum* species.(T-245 and Rajitha). However accessions from *L. peruvianum* (LO0687, LO0669) and *L. hirsutum* (LO1064, LO1065) species were difficult to cross with cultivated varieties of *L. esculentum*. Pollen irradiation by 3kr gamma rays was found to be a successful method to overcome the barrier of cross-incompatibility. In this study successful results were obtained by the crosses made between accession LO0687 (*L. peruvianum*) and *L. esculentum* and accession LO0645, LO1065 (*L. hirsutum*) and *L. esculentum* species.

So these donors could be used in hybridization programmes. The species of *L. pimpinellifolium* and *L. cheesmanii* are self compatible species, but *L. hirsutum* and *L. peruvianum* are self incompatible species. But the irradiation treatment is one of the method to break the incompatibility and can be used as a way to incorporate good characters into cultivated types.

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## Effect of Feeding Urea Molasses Based Supplements on Reproductive Performance of Dairy Cows Under Grazing Management

<sup>1</sup>Uthayathas.S and <sup>2</sup>Perera,A.N.F

An experiment was conducted to study the effect of feeding urea-based supplement on performance of Sahiwal cows under grazing conditions in Marandawila National Livestock Development Board farm. Thirty-six Sahiwal dairy cows on same parity and had similar performance in previous lactation were allotted at calving to three groups. Conventional concentrate (37.5% molasses, 37.5% rice bran, 20% coconut poonac, 3% salt and 2% mineral mix) was fed to one group. Other two groups (T<sub>1</sub> and T<sub>2</sub>) received concentrate mixtures in which 40g urea per kg concentrate and 40g urea plus 30g fishmeal per kg concentrate respectively have been used to substitute 50% and 75% of coconut poonac in conventional mixture. All the cows were offered with free grazing and milked twice a day. Concentrate intake was recorded and proximate composition of representative samples was analyzed. Milk yield of individual cows was recorded weekly for the entire lactation. Milk samples were used to determine fat content and hormonal assay was performed to determine the reproductive status of the cow. Visual observations of estrus were made twice daily. Only cows manifesting standing estrus were inseminated commencing 60 days following parturition. Actual milk yield and 4% fat corrected milk yield were higher ( $p < 0.05$ ) in T<sub>1</sub> compared with T<sub>2</sub> or control (T<sub>0</sub>). Milk yield per kilogram of concentrate was lower ( $p < 0.05$ ) in T<sub>0</sub> group compared with T<sub>1</sub> or T<sub>2</sub>. Days to first standing heat, Number of service per conception, Days open and Calving interval of the herd was  $50.5 \pm 8.58$  days,  $2.2 \pm 0.794$ ,  $97 \pm 18.6$  and  $389.7 \pm 17.8$  days respectively and not affected by feeding urea. The results of this study suggest that substitution of coconut poonac with urea in the conventional concentrate reduces the cost of feeding which increases milk yield and persistency while unaffected the reproductive performance in Sahiwal cows maintained under grazing conditions.

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## Effect of Supplementary Milk Feeding on Growth and Survivability of Piglings

Kiritharan, Y and Uthayathas, S.

About 10 to 15% deaths usually occur in piglets from their birth until they are weaned at the age of about 8 weeks from their mothers. Mortality rates exceeding 15% constitute serious overhead expenses in any piggery across the world. The causes of preweaning piglet mortality are varied and may be due to predisposing factors such as bad management, susceptibility to diseases, sow health and extremes of weather. Starving found to be one of the causes of piglet mortality. An experiment was conducted to study the effect of supplementary milk feeding on growth and survivability of preweaned piglings. Sixty new born piglings born to 6 largewhite sows were allotted at farrowing to two groups. One group nursed by 3 sows, was fed with dam's milk and creep feed. Where as the other group nursed by 3 sows, offered with supplementary milk feeding in addition to the usual dam's milk and creep feed. Milk was fed twice a day at the rate of 0.4l/head/day by feeding bottle or plate. Introduction of creep feed and provision of dam's milk was similar to both group. Average daily gain in the first 2 weeks was higher ( $p < 0.05$ ) in milk fed group than control. Though milk supplemented group continued to gain higher weight than control the difference was not significance from third week onwards. Milk fed group gained 16% higher weight than control during the preweaning stage. Preweaning mortality was 16.6% and 6.6% respectively for control and milk fed group. Mortality was lower ( $p < 0.05$ ) in milk fed group than control. The results of this study suggest that supplementary milk feeding improve the weight gain while reduce the mortality of preweaned piglings.

## Validity of Locally Established Protocol for Embryo Transfer in Rabbit and Mice

<sup>1</sup> Karunairajah.S, and <sup>2</sup> Perera. E.R.K

Embryo transfer (ET) is an assisted reproductive technique, which needs to be established and used in Srilanka. This study was conducted to confirm the validity of a locally established protocol of embryo transfer for mice, to examine the feasibility of embryo transfer in rabbit.

Four to six week old BALB/Cj mice having 25-30g body weight was used for the protocol validation study. Donor female mice (n=6) were given intraperitoneal injection of 5IU pregnant mare serum gonadotropin (PMSG) and 4.5 IU human chorionic gonadotropin (HCG) 48 hours apart. After placing them with males, the female having vaginal plugs were used for embryo retrieval. Collected embryos were counted under stereomicroscope. These mice were responded well for the superovulatory hormonal regime, and produced an average of  $15 \pm 0.4472$  embryos/ mouse. Those embryos were transferred to synchronized recipient female (n=20 per recipient) under anesthesia (100 mg/Kg ketamine) using locally improvised instruments.

To examine the feasibility of embryo transfer in rabbit, a suitable anesthetic dose was established using 6 rabbit does having a body weight of  $3.4166 \pm 0.1536$  kg. Different dose combination of ketamine and xylazine was used and physiological responses were recorded. 20mg/kg ketamine and 5mg/kg xylazine combination with a supplementary dose of 8.3mg/kg ketamine were found to produce satisfactory anesthesia until surgery is completed.

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Three donors and three recipients were used for embryo transfer. Donors were given 150 IU PMSG followed by 100 IU HCG after 72 hours, and placed with males. The recipients were given 100 IU HCG at the same time of donor injection. The recipient vagina was further stimulated with a glass rod to induce ovulation. Between 60-72 hours from HCG injection, laparoscopic embryo retrieval was performed using improvised devices. Modified Dulbecco's phosphate buffered saline was used to flush the embryos out of the oviducts, and to manipulate embryos. However, no embryos could be retrieved suggesting the need for refinement of superovulation regime and timing.

## Microbial Enzymatic Degumming of Crude Soybean Oil

Prabhahara, M.

Removal of free fatty acid from crude edible oils can be done by chemical neutralization combined with physical refining like vacuum distillation. The latter method requires that the phosphatide (Gum) content is less than 10 ppm. Here target level of gum removal (Degumming) was attempted by using microbial phospholipase enzyme (Lecitase Novo) combine with water degumming under optimum conditions with mixing. The chemical degumming was attempted with citric acid and sodium hydroxide, which are commonly practice for faster gum removal.

Edible oil quality was mainly depended on following properties such as phosphatide level, acid value and peroxide value. Characteristics of crude soybean oil were phosphatide content 700 – 750 ppm, acid value and peroxide value 1.82% and 5 meq / Kg respectively. After degumming process chemical and enzymatic degummed oils gave the value of phosphatide less than 10 ppm and acid value  $4.55 \pm 0.46$  and  $3.64 \pm 0.23$ , peroxide value  $12.5 \pm 0.5$  and  $9.5 \pm 0.7$  respectively. Higher free fatty acid (Acid value) and peroxide value generally reduces the edible oil quality. The microbial phospholipase enzymes are an economically attractive in edible oil processing which exhibits some unique features while compared to chemical and physical methods.

## Socioeconomic Determinants of Malnutrition in Preschool Children of Postwar Jaffna Society- a multivariate analytic approach

Elankumaran, C

The study of malnutrition in a society is important as individual health determines the socioeconomic development of the region. Malnutrition is a primary cause of death in preschool children. The war and related atmosphere in Jaffna region has affected the food security of the region, created unusual poverty in families, and thereby caused the nutritional status of individuals (Elankumaran, 2003).

The purpose of this study is to determine the socioeconomic factors responsible for discriminating the degree of malnutrition in preschool children during the period of postwar situation, i.e. after 1997. The anthropometric measures: **Mid-upper arm circumference (MUAC)** and **Height** of the preschool children were employed to characterize acute and chronic malnutrition respectively. A number of key variables have been subjected to multivariate statistical analysis. The data required for the study were obtained from the questionnaires used in **Jaffna Socioeconomic Health Study – 1999**.

Characteristics of **Wasting** by **MUAC** revealed that about 5.12% and 19.13% of the preschool children had severe and moderate acute malnutrition. It is also found out that the postwar situation has associated with more acute cases of malnutrition than the previous situations. Characteristics of **Stunting** by **Height-for-Age** revealed that about 2.16% and 52.29% of the children had severe and moderate chronic malnutrition.

Socioeconomic variables related to 'Family Structure', 'Food intake', 'Education-Occupation', and 'Monetary Status' of the families and height-for-age were subjected to multivariate analysis to see the patterns of chronic malnutrition. Multidimensional cluster analysis on the variables revealed that there were four distinct groups of preschool children in terms of chronic malnutrition. The application of canonical discriminant analysis on these clusters revealed that two groups (Better nourished children) were discriminated from the other two (Under nourished children) by the family structure, height-for-age, and expenditure on health. Further, one group was discriminated from the other in both cases by per-capita energy and protein consumption of the families.

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Cross-classification of the above four clusters against the unidimensional clustering by height-for-age revealed the naming of preschool children as “Severe malnourished children” (28.6%), “Moderate malnourished children” (34.1%), “Mild malnourished children” (23.5%) and “Well nourished children” (13.8%).

**Reference :**

Elankumaran (2003) Malnutrition in Preschool Children of Jaffna Society – A Post Exodus Statistical Perspective, Proceedings of Ninth International Conference on Sri Lankan Studies, University of Ruhuna, p96.



## Effect of some entomopathogenic fungi on Barnyard earthworm, *Eisenia fetida*

<sup>1</sup>Mikunthan, G. and <sup>2</sup>Manjunatha, M

The number of entomopathogenic fungi has been increased in the recent past as a viable alternative to toxic chemicals to manage pests of crops. The subsequent inundation of entomopathogenic fungi will increase the inoculum potential in the soil. Hence, an attempt is made to understand the effect of entomopathogenic fungi on the soil dwelling animals like earthworms.

A bioassay was conducted on common barnyard earthworms, *Eisenia fetida* to evaluate their growth and composting performances with different entomopathogenic fungi grown in organic wastes. Seven isolates of entomopathogenic fungi viz. *Beauveria bassiana*, *Fusarium* sp., *Verticillium lacanii*, *Metarhizium anisopliae*, *Aspergillus niger*, *Penicillium* sp. and *Nomuraea rileyi* were tested. Weight of the earthworms were taken before releasing and after 15 days. A control was maintained without adding the fungus. After 15 days nature of casting, presence of hatchlings were also recorded.

All the fungi except *Penicillium* sp. were found compatible with the earthworms and per cent weight gain recorded in almost all treatments were on par with control. The weight gain of earthworm was in a range of 52.88 to 68.92 per cent in the fungi treated compost including control (65.07%) except in *Penicillium* sp., which did not support the growth of the earthworms and recorded only 6.61 per cent weight gain. The results revealed that the common entomopathogenic fungi such as *B. bassiana*, *M. anisopliae*, *N. rileyi* and *V. lacanii* were apparently compatible with the earthworm. In addition, the weak entomopathogens like *Fusarium* sp. and *A. niger* were also not harmful to the earthworms.

Hence, subsequent inundation of entomopathogenic fungi for the control of crop pests will not affect the earthworm activity for making compost and these fungi can be mixed with organic wastes that are used for compost making.

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## Nature of Yala paddy production and cost of production in Mannar district

Ajeevan, T. and Sooriyakumar, K.

Mannar district has high potential for cultivating paddy, compare to other districts of Northern region. Marketing system for agricultural products and inputs in Mannar district is not functioning effectively. Most of the Mannar farmers are cultivating paddy in Maha season. Farmers are facing difficulties in Yala paddy cultivation due to insufficient water for irrigation. But higher price for paddy in Yala season leads farmers to cultivate paddy in Yala season. So, Yala paddy cultivation seems to be important to overcome low income problem and for optimum usage of land resource.

Objectives of this study are to identify nature of paddy in Yala season and also to identify the nature of cost function and factors influencing average cost paddy production. Simple random sampling method was used to select hundred farmers from five AGA divisions for this sample survey and primary data were collected from the selected farmers by using questionnaire. A COBB-Douglas model for paddy production and average cost function for paddy production were developed using OLS method.

The result of these study reveals that the amount of Top Dressing Mixture (TDM), urea, pesticides influences the yield of paddy cultivation and it shows that all the samples taken on this study in the portion of production function where production increases with the TDM, urea and pesticide. Further, this study shows that average cost of paddy production increases with the yield of paddy. It explains that production function of paddy of this area is in the portion of production function where average production decreases with amount of outputs. If farmer want increase yield by a unit amount ha has to apply more inputs. So, it will increase the average cost of production and also this study shows that average cost decreases with the extent of paddy cultivation. It indicates the economics scale. When the extent of paddy cultivation was increased the average total cost will decrease. It means that farmer will be able to reduce some costs related with labour cost and machinery cost for various agricultural practices. Improving the marketing channel for inputs and output, providing credit facilities, providing subsidies for fertilizers and agro chemicals will increase the yield of paddy in the Yala season as well as reduce the average total cost. It will help the farmers to get stable income by cultivating paddy in Yala season.

## Determinants of female children's time allocation in home activities Locality study in kilinochchi district

Selvaratnam, R. and Sooriyakumar K.

Kilinochchi district is a potential area for cultivation of paddy and other crops. Agriculture is the main sector for income and employment in Kilinochchi district but income from farming is low and unemployment rate vary with the season. Here, the children participate in farming activity. Due to the poverty, some of the children are forced to enter the labour market. The data for this study were collected randomly from the five selected village namely Jeyapuram, Urey, Ampalkulam, Thiruviaru and Soranpattu by using the questionnaires. A stratified random sample of total of 110 households was constructed during this study to ensure the representation of labour households and cultivator households.

A Probit and Tobit model were developed for the participation and time allocation of agricultural household female children in home activity respectively. Probit model for participation of female children in home activities shows that when the male wage rate, child wage rate, and number of boys in the family, number of adult females and males increases, the probability for participation of female children in home activity decreases and when the female wage rate, age of female children, number of young children and extent of land holding increases the probability for participation of female children in home activity increases. But here, only estimates for age of children, child wage rate and number of male children are only significant at 5% level.

Tobit models for time allocation of female children in domestic work and farming activity show that when the male wage rate, child wage rate, number of boys, number of adult females and male in the family increases, the time allocation of female children in both activity decreases and when the female wage rate, age of child, number of female children and extent of land holding increases the time allocation of female children in home activity increases. When the number of young children increases in the family the time allocation of female children in domestic work increases because they have to look after young children in home. So, it reduces their time allocation in farming activity.

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In these models, only estimate for age is significant at 5% level. This study shows that poverty is the main reason for the participation of female children in domestic and farming activities. Present poverty eradication program that is implemented by government and non-government organization is not effective to reduce the female children participation in domestic and farming activities. So, a well-planned poverty eradication program should be implemented in this area. Large family also is one reason for the poverty and for the participation of female children in domestic and farming activities. Family planning program should be introduced to increase the awareness of better family planning among household. Present education system also should be improved in order to increase the attendance of young female children up to secondary education.

## Factors Influencing the Adoption of Leeks Cultivation in Jaffna District

Nikarilkanth, K. and Sooriyakumar, K.

Jaffna district has potential for cultivating various crops. Jaffna farmers are cultivating low country as well as up country vegetables successfully. But, when compare with other vegetables cultivation, adoption of leeks cultivation is considerably low in Jaffna district. The major factors that influence the adoption of leeks cultivation are educational level of farmer, non-farm income, market distance, farm size, characters of divisional area, experience of leeks cultivation and capital availability. The objectives of this study are to identify the nature of leeks cultivation and the factors influencing adoption of leeks cultivation in Jaffna district.

Simple random sampling method was used to select 60 farmers from Uduvil and Kopai AGA divisions and primary data were collected from the selected farmers by using the questionnaire. A Tobit model was developed for the adoption of leeks cultivation. This study revealed that education level of farmer, other provision income of farmer, experience of leeks cultivation and capital availability of farmer positively influence the adoption of leeks cultivation and are significant at 5% level except education level. Land area of farmer, distance from market negatively influences the adoption of leeks cultivation and significant at 5% level. Adoption of leeks cultivation in Uduvil division is higher than the adoption of leeks cultivation in Kopai division and significant at 5% level.

## Nature of Labour Supply Function in the Agriculture Sector of Killinochchi District

Sivasothithurai.B and Sooriyakumar.K

This study investigates the labour supply behavior of agriculture workers in killinochchi district. Agriculture sector is the main sector for income and employment of the households of this area. Other sectors such as industries and service sectors are not developed. So the employment in these sectors is very low. Here, labour market is not organized and developed. Objectives of this study are identifying nature of labour supply function and the factors influencing the labour supply in this area. The data for this study were derived from a sample survey from three villages namely Thiruvaiyaru, Ambalkulam and Soranpattu. A total of 90 agricultural labour household were randomly selected for this survey.

Ordinary Least Square method was used to develop a model for labour supply in this district. This study shows that relationship between total labour supply and wage rate is in quadratic form. Labour supply of landless and near landless male worker is forward falling at low wages and upward rising at high wages. Total labour supply increases with extent of own land area and number of dependants per male worker. Total supply of labour decreases with the education level of the farmer. In an advanced village the labour's working time is less than in poor or average village. Family in advanced village may get income from other non-farm sources such as returns from their capital. In advanced village, labour supply is rising with the increase in wages but bends backward at higher wages.

Number of depends per male worker and village dummy variable are significant at 5% level. This study shows that labour supply of landless and near landless male worker is forward falling at low wage. Because they have to earn minimum income for their expenditure they increase their labour supply when wage decreases to very low level. High unemployment rate and seasonal employment are the main reasons for the nature of this labour supply. Most of the employment is in agricultural sector. Contribution of other sectors such as industry and service sector for the employment is very poor. These sectors were not developed due to the war and poor government investment in public goods in this area. To avoid this forward falling labour supply, unemployment rate should be reduced. So other sectors should be improved to increase the employment opportunity. A necessary action should be taken to bring labour market in organized form.

## Technical Efficiency of Potato Production in Jaffna Districts

Kanagalingam, K. and Sooriyakumar K.

In Srilanka commercial scale potato production is mainly concentrated in two districts Badulla and Nuwara Eliya. However, substantial extent is cultivated in Jaffna districts also. The planting season of these three districts are largely determined by the rainfall pattern and the temperature regime. Potato is one of the profitable crops. Nowadays extend of land and production of potato drastically reduced in Jaffna districts due to the high cost of production and inadequate market facilities. Potato cultivations in Jaffna district are mainly depend on their own experience due to lack of extension services and agricultural research on cultivation practices.

For this study, Seventy-four farmers cultivating potato were selected by using simple random sampling method from the four major potato-growing ASC divisions in the Jaffna district, namely Uduvil, Urumpirai, Nallur and Puttur. A structured questionnaire was used to collect the data on yield, seed rate, fertilizer, irrigation interval, land area and informal discussions were held to gather information on their experience in Maha 2004.

The stochastic Cobb-Douglas production frontier model specified by Battese and Colli (1995) was developed to explain technical efficiency of potato production in Jaffna district. The parameters of the stochastic frontier production function model are estimated by the method of maximum likelihood, using the computer program, FRONTIER version 4.1 (Colli, 1994).

According to the econometric results, all factors considered in this study such as seed rate, fertilizer, irrigation level, land area and experience were significantly affect the potato production. Increasing seed rate and shortening irrigation interval were negatively influenced on the potato production. But fertilizer level, land extent and experience on potato cultivation positively influenced on potato production. The average level of technical efficiency was found to be 89%, indicating that the production would increase by 11%, if all the farmers achieved the technical efficiency as the level of best farmer. However, the average level of best farmer is below the potential yield. The results indicate that experience of the farmers positively influences on potato production. So, improving the research on potato cultivation in this area and dissemination of new technology on potato cultivation to the farmers will increase the technical efficiency of potato cultivation in Jaffna district.

## Participation of Farm owners and off-farm Work in Jaffna District

Nadarajah, N. and Sooriyakumar, K.

This research examines the time allocation of the Jaffna farm owners between farm work and off-farm work. The Jaffna district is a potential area for paddy, vegetables and cash crops. Agriculture is the main sector for income and employment in the Jaffna district but income from farming is low and unemployment varies with the season. The outbreak of war in the Jaffna district has disrupted development in all sectors of the economy such as agriculture and fisheries. The non-availability of cultivable land, middle men problems, lack of knowledge to the farmer, higher farming labour cost, price instability, poor harvest, lack of marketing facilities and loss of livestock by displacement are main reasons for the low income. Due to the above reasons farm owners forced to find off-farm work.

The data for this study was collected randomly from the 11 divisional secretariat divisions of Jaffna districts (North Jaffna, Nallur, Valikamam Suthwest, Vlikamam West Vlikamam South Valikamam North, Vadamaradchi east). A simple random sample of a total of 101 farm owners was taken during this study to ensure representation of all categories of time allocation of farm owners in Jaffna between farm work and off-farm work that include working only on-farm, only off-farm and both on-farm and off farm.

Multinomial logit model was developed to find the relationship between choice of work and factors influencing this choice of work. The results show that when the education of the farm owners increases, the probability for working only in the “off-farm work” and both “on-farm and off-farm work” increases, but probability for working only in the “on-farm” decreases. With the age of farm owner, the probability for participation in “only on-farm work” and “only off-farm work” decreases. When land holding of the farm owner increases the probability for participation in only “off-farm work” and in both “on-farm and off farm work” decreases. With family size of farm owner, the probability for participation in both “on-farm and off farm work” and “only off farm work” increases, but probability for participation in “only on-farm work” decreases. When the size of dairy farm increases, probability for participation in “only on-farm work” increases but the probability for participation in “only off-farm work” and in both “on-farm and off-farm work” decreases. In this model, Coefficient for age and education is significant at 5% level.

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## Preliminary Study on Malarial Situation Among the Fever Patients Attending the District Hospital, Kilinochchi

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Malaria continues to be a major public health problem and socio-economic burden to Sri Lanka. In Sri Lanka, Kilinochchi District was identified as one of the highest malaria cases reported area in 1999. According to the Anti Malarial Campaign, there is a drastic reduction in the malarial cases after 2002. This study was designed as a preliminary study to find out the prevalence of malaria among the fever patients attending to District Hospital, Kilinochchi. Over the period of 3 months, 346 blood smears were prepared and microscopically examined by us and the microscopist at District Hospital, Kilinochchi. Among those fever patients, 87% of them had the previous history of malaria and completed the full course of malarial treatment. There was no difference between microscopic examination method or the results done by the microscopist and us. Based on the microscopic examination, it was found that the prevalence of malaria among the fever patients was 0.87%. Of the 0.87% (03) malarial patients, 66.67% were infected with *Plasmodium vivax* and 33.37% were infected with *Plasmodium falciparum*. The patient infected with *Plasmodium falciparum* was a resident of Batticaloa recently started working at Kilinochchi. Among the malarial patients, 66.67% were males and 33.37% were females. The children of age between 5 to 9 were mostly affected (66.67%) than the older patients (>15 years; 33.37). Patients' awareness regarding malaria was high (90%) with 50% of patients using mosquito coils, 40% using bed nets, 8% using smokes and 2% using home made net with sarees. Preliminary data from this study confirms the low prevalence of malaria cases in patients reported to the Kilinochchi, District Hospital. This study opened up an area to find out the reasons for the reduction in the prevalence of malaria within a short period.

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## **Prevalence of hypertension among middle class office workers and selected associated factors with special reference to obesity**

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Recent increase in the prevalence of hypertension among Sri Lankans are suggested to be caused largely by an environment that promotes sedentary lifestyle and obesity. The objective of this study was to estimate the prevalence of hypertension among middle class male office workers and to identify the possible risk factors. A cross sectional study was carried out among middle class office workers in Ceylinco Insurance Company, Colombo. A group of 150 apparently healthy male workers were recruited to the study. Their age ranged from 30 to 55 years. Weight, height, waist and hip circumferences were taken. Three consecutive blood pressure values were taken for each subject and the average of last two values were considered. A self-administered questionnaire was employed to collect the data. The prevalence of hypertension was found as approximately 9%. Over weight and obesity among the respondents were found as 31% (n=46) and 32% (n=48) respectively. Body Mass Index (BMI) had a significant impact on the Systolic Blood Pressure (SBP) & Diastolic Blood Pressure (DBP) of the subjects (P=0.031 & 0.003). Obese people had the highest value of blood pressure level while the overweight subjects had the 2<sup>nd</sup> highest value. WHR of the subjects who were above the cut off value for central obesity (>0.9) had a significantly higher values of SBP & DBP levels (P=0.008 & 0.016). Both BMI and WHR are the good indicators for total body fat distribution and abdominal fat distribution respectively and contribute to obesity. There was a positive association between the socio-demographic factors and the habits of smoking and alcoholism with increased blood pressure levels, but the association was not significant. Family history hypertension showed a significant impact on the increased systolic blood pressure level (p=0.04). In conclusion prevalence of hypertension was tending to be low against the estimated Island wide value. Nutritional indices (BMI and WHR) and family history are the significant risk factors for hypertension among the middle class male office workers.

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## Influence of Monsoon on Fish Production in Mannar District

Soosai.A.S.

Sri Lanka being an Island has been greatly influence by the monsoon. Fishing is one among the main activities in this country has been influenced by the monsoon. This has been well documented when comparing the monthly production of fish under district level. The coastal areas of Northeast and Eastern region are directly affected by Northeast monsoon and Northwest and western coastal areas are affected by Southwest monsoon. The fish production was found low during the period of the severe influence by the respective monsoon and the production was comparatively high during the remaining period. This characteristic effect was very clear in Mannar district.

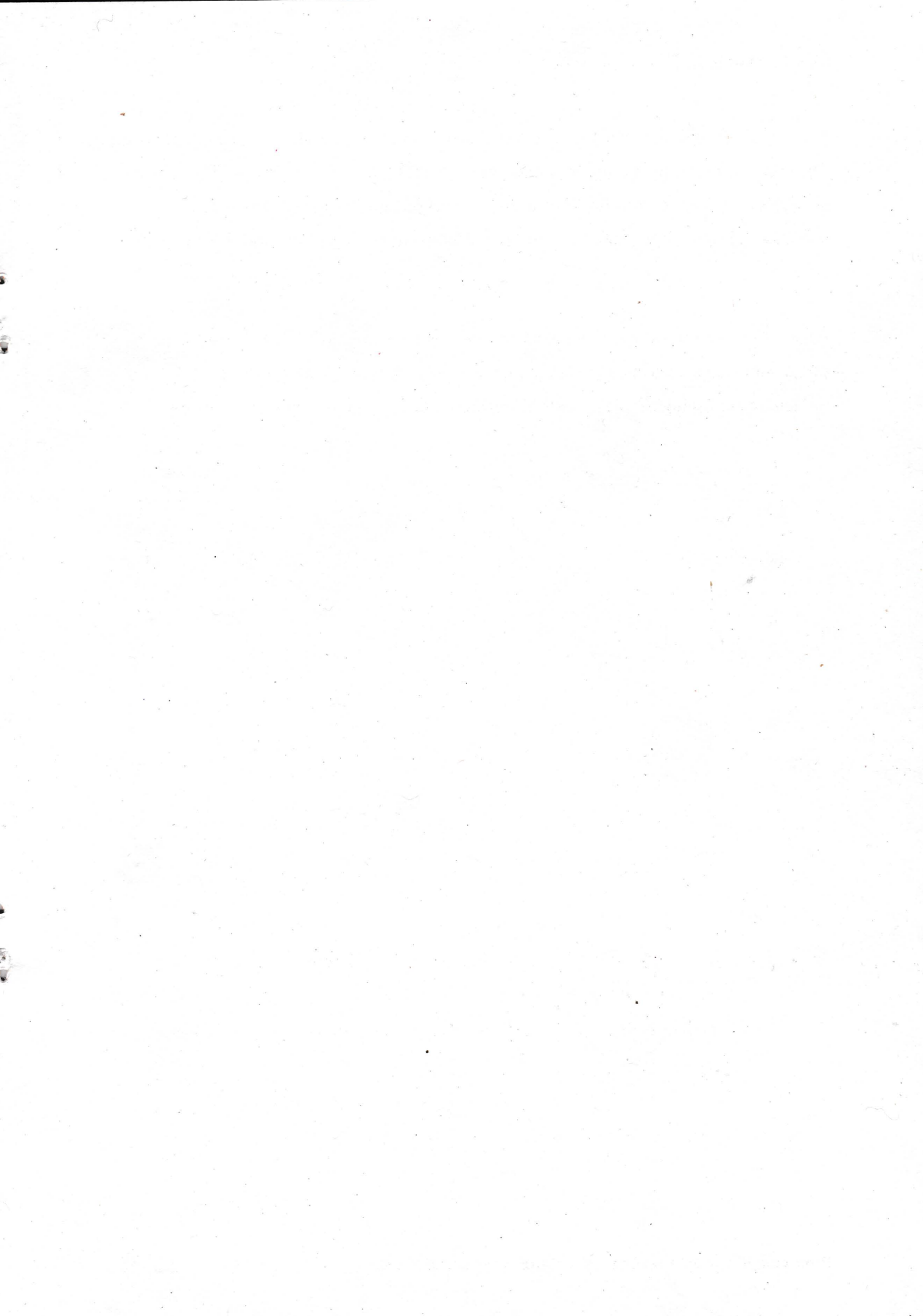
Fishing is an economical profession of the people of Mannar district. The location of this area has been mainly affected by the Southwest monsoon (May-September). Data offish production chank collection and beach de-mer collection were recorded from department of Fisheries. Climatological data were collected from Colombo Meteorological station. The relationship between the production functions and monsoon speed was derived. The relationship between fish production and monsoon speed was negatively correlated in all cases. The calculated values of correlation were --(). 756 and --(). 353 during 1983 and 2003 respectively. During Southwest monsoon (May-September) the average wind speed ranges between 14.0km/h to 15\_9km!h and the height of waves varies from 1-2 meters. Due to im balanced condition in sea water which was associated with high turbulence and increased turbidity reduces the production offish collection of chank and collection of beach de-mer.

During the years 1960, 1983snd 200 under the southwest monsoon the fish production was 135-18Omt. 600- 700mt and 320-400mt. respectively. The collection of chank was O.2- I.4mt and collection of beach de-mer was O-1.9mt where as during Northeast monsoon the fish production was 250-300mt. 1600-2409mt. and 450-1250mt during 1960, 1983 and 2003 respectively.

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A range of 1.5mt-4.5mt chank was collected and 8.0-1.8mt of beach de-mer also collected. The speed of monsoon during this period was 8.5-11.8 km /h and the height of waves was about 1 meter. The sea was found calm and very' clean for fishing and other activities. This condition of sea water enhance fish production chank collection and beach de mer collection.

Finally the results of all Production functions were negatively correelated with fish production chank collection and beach de mer collection in Mannar district. This factor influences the fishing people in Mannal" district for local migration in various places.



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