

Abstracts of Presentations

Chemical properties and biological activities of *Morinda* spp.

Dr. N. Mathivanan, Ph.D

and

G. Surendiran, Research Scholar

Noni Phytochemical Research Programme

World Noni Research Foundation

Morinda citrifolia, a small tree, grows predominantly along the tropical coasts. It is being used in folk medicine. Antibacterial, antiviral, antifungal, antitumor, antidiabetes, analgesic, anti-inflammatory, immune enhancing activities of *M. citrifolia* have already been reported. Another related species, *Morinda pubescens*, a small tree grows in tropical regions of vacant agricultural land is comparable to *M. citrifolia* in its medicinal and other properties. However, no scientific research has been carried out in our country and hence the present study is focused to explore the potentials of *M. citrifolia* and *M. pubescens*.

Chemical analyses have revealed that most of the essential elements were present in higher amount in the fruits of *M. citrifolia* compared to *M. pubescens*. But Manganese was present in high quantity in *M. pubescens*, whereas Calcium, Potassium, Phosphorus and Magnesium were found to be on par in both the fruits. The reducing sugars and lipids were present in high levels in the fruits of *M. citrifolia* whereas, the total soluble sugars, starch and crude fibers were high in *M. pubescens*. The natural antioxidant content was found to be high in the fruit extracts of *M. pubescens* compared to *M. citrifolia* which was estimated by the method of FTC and TBA.

The fruit extract of *M. citrifolia* and *M. pubescens* effectively inhibited the human and plant pathogens. This antimicrobial activity was more pronounced with *M. citrifolia* than *M. pubescens*. Further the fruit extracts significantly inhibited the protein synthesis and respiration rate in human and fungal pathogens. Both the plants showed excellent hepatoprotective effect against D-galactosamine intoxicated experimental rats. The fruit extracts of *M. citrifolia* and *M. pubescens* have also shown effective antidiabetic activity in alloxan induced experimental rats. This activity was more pronounced with *M. pubescens* than *M. citrifolia*. The fruit extract of both the plant showed good plant growth promoting activity in rice and green gram. However, this activity was more pronounced with *M. citrifolia* than *M. pubescens*.

Crop Improvement in *Morinda citrifolia*

Dr. J. Subramani, Ph.D
Noni Crop Development Programme
World Noni Research Foundation

Among all the new innovations and activities, information technology and biotechnology ruled the world for the past two to three decades. In the field of Plant biotechnology, the technical advances have been tremendous and unique in their application as commercial tools to improve agriculture, silviculture, horticulture and agro industries. Knowing the above advantages, Noni plants were taken for rapid multiplication using tissue culture techniques at the tissue culture lab in Chennai.

Axillary buds were taken from young seedlings and after proper sterilization these buds were inoculated to Murashige and Skoog's media containing various hormone combinations. After successful culture initiation at in-vitro buds were subjected to rapid multiplication. An excellent rate of multiplication with enough elongation of the multiple shoots were achieved in the media. After multiplication, shoots of 4cm in length and above were separated individually and inoculated to rooting media to produce roots. Enough roots were produced within 18 days in –vitro. Six thousand rooted plants were transferred to greenhouse for hardening. After hardening for 4 weeks about 900 plants were transferred to polybags at nursery for further hardening and field transfer.

Other than micropropagation, Noni biotech division will also enter into new research area like:

- Cell culture to produce saline tolerant plants
- Micropropagation of elite clones
- Isolation and identification of cells invitro
- Cell immobilization for production of nutraceuticals
- Bioreactor technology.

Morinda citrifolia – an evergreen tool for Commercial Horticulture

Dr. D.R. Singh, Ph.D

Noni Crop Development Programme

World Noni Research Foundation

Morinda citrifolia var.citrifolia, the commonly called NONI in India, and also known as the Indian Mulberry is one of the important plants of Rubiaceae family. Noni's broad proliferation gives testimony to its value to traditional cultures. In Andaman and Nicobar Islands, it is widely found through out the coastal region and also found growing wild along the fences and the roadsides due to its wide adaptability to hardy environmental climatic conditions. The noni plants grow in saline soils, alkaline soils and any type of good and waste lands. The whole plant i.e., leaf, stem, root and fruits is known to be of commercial importance. The most important fact is that tribes of these islands are known to consume this fruit raw with common salt as well as cooked as vegetable. After Tsunami disaster, it has been found that *Morinda* is only plant of commercial value, which is surviving in affected lands turned wastelands due to seawater intrusion. Further study at this Institute shows that this plant can be used for rehabilitating the livelihood of farmers affected by Tsunami. Thus *Morinda* plant can survive particularly in seawater inundated saline soils and in all kinds of soil in Andaman and Nicobar islands. This plant can come up under the 50 percent shade and can be grown as intercrop. The canopy coverage provides very good cover to soil, resulting reduction in soil and runoff losses. The yield of *Morinda* fruits per tree initially is 10Kg/tree in the 3rd year and can be harvested 5-8 times in a year. The fruit is generally used to extract the juice for medicinal uses.

Morinda cultivation assumes the regular income and employment security, which is the need of the day. Since Indian economy is agricultural based, crop diversification is one popular way of optimizing the limited sources. *Morinda* plant is having its commercial potential for these islands due to its hardness and plant having nutritional, medicinal values. This is also good feed material for poultry enterprises. If *Morinda* juice is fed to poultry, it provides immunity and is rich in peptides, which is useful for proper growth. However, morinda is rich in minerals, *Morinda* leaves can be used as mulch material, which provides very good nutrition and conserves moisture. Thus, *Morinda* cultivation in crop diversification era is an important option due to its economical importance, environmental adaptability, increase in salt affected areas after Tsunami, and employment generation potential, assured market system and several favorable conditions exists in these islands.

Clinical and Cellular Improvement in AIDS Using Indian Noni

Dr. Vijay Mohan, MD

*Noni Clinical and Research Programme
World Noni Research Foundation*

Noni has got great immunity boosting effect in our body. Nutraceutical, and Enzymes present in Indian Noni enhance the cell growth and fight against pathogens which enter the body.

A study has been conducted in Divine Touch Hospital, Suryapet Nalgonda, and AP, from March 06 to September 06, 6 patients who were diagnosed as HIV patients. They were given only INDIAN NONI. There was a considerable improvement in the clinical status of the patients. A sense of well being and an increase in complexion of skin with improvement in Hb% was observed in all the patients, with in the 15 days of Indian Noni intake. General conditions with increased appetite, weight gain, good sleep and vital data set to normal was observed at the following visits. CD4 count has been started increasing and viral load is decreasing in all patients, were observed more in the HIV patients who were diagnosed at earlier stages. The study is under progress.

Review on the Anti-Inflammatory and Analgesic Activity of *Morinda citrifolia* (NONI) in Experimental Animals

Dr. D.N.Srivastava, Ph.D

Noni Experimental

Research Programme

World Noni Research Foundation

Inflammation is a response of living tissue to an injury. This consists of series of events involving vascular and cellular changes to eliminate the noxious agent(s) and repair the damaged tissue. The stimulus for inflammation can either be immunological or non-immunological in origin. The inflammation involves a series of defensive and reparative changes which is normally a beneficial process for organism but many a times it may be harmful. Allergic and rheumatic diseases fall into this category. Inflammation is associated with cardinal signs like redness, heat, pain, swelling and loss of function. The chemical mediators of inflammation elicit certain changes in inflammatory processes.

The anti-inflammatory drugs are employed to counter the effects of inflammation and danger to the normal functioning of the affected tissues. Many of the non-steroidal anti-inflammatory drugs (NSAIDS) have been reported to act on acute and chronic inflammatory reactions by inhibiting cyclo-oxygenase (COX) enzyme. In addition to anti-inflammatory, analgesic and antipyretic activity, NSAIDS cause gastro-intestinal, hepatic and renal toxicities in man and animals (Vane and Ferreira, 1979). This stimulated the search for new compound possessing potent anti-inflammatory activity vis-à-vis least toxic effect. Number of herbal agents have been found useful in different inflammatory conditions. *Morinda Citrifolia* (NONI), an indigenos medicinal plant has been reported to possess anti-inflammatory, analgesic and anti-ulcerogenic properties.

Noni has been found to be effective in allaying pain and controlling painful inflammation and swellings. Studies in mice have further demonstrated that the aqueous root extract of NONI did show dose related central analgesic activity in writhing and hot plate tests (Younos *et al*, 1990), Two types of COX enzymes, the COX-1 and COX-2 have been discovered indicating COX-2 enzyme largely responsible for causing pain and inflammation, whereas, COX-1 enzyme is responsible for protecting the stomach lining and kidneys. Noni juice selectively inhibits COX-2 enzyme while allowing the COX-1 enzyme to continue functioning. Scopoletin, an important ingredient of Noni has also been found to exert strong anti-inflammatory activity. Scopoletin has also been reported to be an analgesic as it significantly increased the reaction time in mice on hot plate analgesiometer. Noni has been

found to be 75 per cent as effective as morphine in relieving pain without toxic side effects of morphine. Unlike morphine Noni is not addictive. Xeronine acts as the supreme pain killer because it works with Endorphine in the body to numb pain and produce feeling of Euphoria. The immunomodulatory action of Noni also helps in controlling autoimmune diseases in man like rheumatoid arthritis.

Role of Indian Noni on Auto Immune Disorders

Dr. G. Bharani, M.B.B.S
Noni Clinical Research Foundation
World Noni Research Foundation

Causes of the Disorder : **Oetiology is unknown**

Autoimmune Disorder : Autoimmune disorder cannot be explained by a solitary cause. Small amount of auto antibodies are normally produced and may have physiologic roles in cellular interaction. The major theories regarding the development of auto immune diseases are: Release of normally sequestered antigens, Escape from energy of defective apoptosis leading to abnormal auto reactive cellular cones, Shared antigens between the host and microorganisms i.e., molecular mimicry.

Defects in helper T cell function.

Immune complex disease : Autoimmune diseases.

Systemic lupus erythematosus, Lupus Nephritis, Rheumatoid arthritis, Scleroderma (Systemic Sclerosis), Psoriasis, Leucoderma

Treatment in Allopathy :

Immune suppressive drugs

Corticosteroids : Inhibits lymphocyte proliferation and cell mediated immune responses.

Cytotoxic drug : Antimetabolites, Azathioprine

Derived from Fungus: Tacrolimus, Muromonab – CD3, Immunomodulating therapies, Intravenous Gamma Globulin

Role of India NONI on Auto Immune disorders

India NONI Stimulates the body's immune system or to increase the natural immunity power by increasing the lymphocytes mainly CD Cells. Thus increases the immunity.

NONI Work as a “Healthy, Immune System Promoter!”

Morinda citrifolia extract stimulates T. Lymphocyte activity

Current Studies have revealed that Noni helps promoting a healthy immune system by either enhancing an already functioning system or by stimulating a sluggish one. In addition, as described earlier, Noni is believed to fortify and maintain cell structure. This can be accomplished by Noni acting as an adaptogen that can aid “sick” cells in repairing themselves.

Case studies of 20 patients with autoimmune disorders were studied.

Studies on Antiviral Activity and Cytotoxicity of *Morinda citrifolia*

Periyasamy Selvam,

Research Scholar

A.K. College of Pharmacy, Krishnankoil

Noni Pharmacological Forum

World Noni Research Foundation

Morinda citrifolia L (Noni) has been used in folk remedies by Polynesians for over 2000 years and is reported to have a broad range of therapeutic effects, including antibacterial, antiviral, antifungal, antitumor, analgesic, hypotensive, anti-inflammatory, and immune enhancing effects. The fruit juice is in high demand in alternative medicine for different kinds of illnesses such as arthritis, diabetes, high blood pressure, muscle aches and pains, menstrual difficulties, headaches, heart disease, AIDS, cancers, gastric ulcers, sprains, mental depression, senility, poor digestion, arteriosclerosis, blood vessel problems, and drug addiction. Based on this finding, present work is to design the study of antiviral activity of fruit juice of *Morinda citrifolia* against pathogenic viruses such as Human Immunodeficiency Virus HIV-1 (IIIB) in MT-4 cells and Hepatitis C Virus (HCV) in Huh 5.2 cells, Cytotoxic activity is also tested in C-type Adult T cell leukemia cell (MT-4) and Human hepatoblastoma cells (Huh 5.2 cells). *Morinda citrifolia* exhibited a maximum protection of 18% against HIV-1 (III_B) replication in acutely infected cells and displayed marked cytostatic activity in leukemia (MT-4) cells with (CC₅₀ = 0.1930 mg/ml). The fruit juice of noni was also tested for inhibition of HCV RNA subgenomic replicon replication in Huh 5.2 cells. Noni inhibits the synthesis of HCV RNA at 23 mg/ml and cytotoxicity was found to be more than 50 mg/ml in Human hepatoblastoma cells (Huh 5.2 cells)

The Antifibrotic effect of the Herbal Formulation “NONI”

Mrs. A.J.M.Christina, Ph.D

K.M. College of Pharmacy, Madurai

Noni Pharmacological Forum

World Noni Research Foundation

The antifibrotic effect of the herbal formulation “NONI” was evaluated in Wister rats. Liver fibrosis was induced in rats by CCl₄ administration. The extent of chemical induced liver fibrosis was assessed by the level of hydroxyproline and serum level of liver enzymes. Hydroxyproline level and serum level of liver enzymes like AST, ALT and ALP were elevated following CCl₄ administration in rats. However treatment of the fibrotic rats with the herbal formulation “NONI” reduced all these parameters. The weight of the liver was also reduced following the treatment. Hence it is concluded that “NONI” is effective against CCl₄ induced liver fibrosis.

Anti helicobacter pylori and uricosuric activity of Indian Noni

C. Pandian

Research Scholar

Ultra College of Pharmacy, Madurai

Noni Pharmacological Forum

World Noni Research Foundation

Anti Helicobacter pylori effect of Indian noni was evaluated by estimating the minimum inhibitory concentration, which was compared with the standard antibiotic drugs. Uricosuric effect of Indian Noni was determined by phenol red excretion in rats. Both the activity of Indian Noni results should be discussed. The implications of findings may prove the efficacy of Indian Noni used in the treatment of peptic ulcer and gout.

Effect of Indian Noni on Psychomotor Performance

Mr. P. Thirupathy

Kumaresan, Research Scholar

Ultra College of Pharmacy, Madurai

Noni Pharmacological Forum

World Noni Research Foundation

Effect of Indian Noni on Psychomotor performance was studied in human volunteers by digital letter substitution method. Mild CNS stimulant, caffeine was used as reference drug. Significant improvement in the Psychomotor performance was noted in human volunteers taking Indian Noni. The effect was more than that of control and also that of reference drug.

Studies on the Chemopreventive/ Chemotherapeutic Efficacy of Indian Noni (*Morinda citrifolia*) fruit juice against experimental Hepatocellular Carcinoma

Prof. D. Sakthisekaran,

Ph.D

*Institute of Basic Medical Sciences,
Chennai*

Noni Pharmacological Forum

World Noni Research Foundation

Proposal :

Hepatocellular carcinoma (HCC) is one of the most frequent malignant tumors world wide and is a leading cause of death in the world. The three major treatment modalities of cancer are surgery, radiation and chemotherapy. Cancer chemotherapy has long been a cornerstone of cancer therapy. Although extensive research has been done on the development of more effective and less toxic agents much less attention has been paid to the factors that may enhance the effectiveness of the existing drugs. No particular treatment fits every patient and some combination therapy is virtually required. Side effects occur with all chemotherapeutic drugs, which are more severe with higher doses and increases over the course of treatment. Researchers are exploring the ways and means to reduce the toxic side effects induced by anticancer drugs during the treatment and to improve the quality of patient's life and reduce the pain. For the successful chemotherapy of Hepatocellular carcinoma we have to identify some natural products that have significant chemotherapeutic and chemopreventive potential with out any toxic side effects. Noni, the botanical name *Morinda citrifolia*, is a medicinal plant that has been used world wide for centuries having a wide range of medicinal properties. Noni plays an important role in cancer preventive and therapeutic approaches. The aim of our study is to delineate Chemopreventive / chemotherapeutic efficacy of Noni against experimentally induced hepatocellular carcinoma in Wistar albino rats. The hepatocellular carcinoma will be induced in the animal model by administering N-Nitrodiethylamine (DEN) (200mg/kg b.wt.) promoted by phenobarbitol (0.05% in drinking water). The Chemopreventive / chemotherapeutic efficacy of Noni fruit juice will be assessed by estimating some vital biochemical parameters along with certain tumour markers.

Studies on the wound healing property of *Morinda citrifolia* on mouse cell line caused by bacterial infection

Dr. Kannan. N, *Pb.D*

and

Dr. Shajuna Banu. Z, *Pb.D*

KSR Institute of Biotechnology,

Thiruchengode

Noni Pharmacological Forum

World Noni Research Foundation

Infection is a major cause of morbidity and mortality in hospitalized burn patients. The infection is due to the combined effect of the impairment of the host natural defence system, colonization of the burn wound site and systemic dissemination of the colonizing organisms.

Avasularity of the burned tissue places the organism beyond the reach of host defence mechanism and systemically administered antibiotics. This constitutes a serious threat to the management of such patients.

Burn wound infections are largely hospital-acquired and infecting pathogens differ from one hospital to another. The most common prevailing pathogens in burn wounds are *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Klebsiella* species, *Proteus* species, *Escherichia coli*, and *Streptococcus pyrogens*. Of these pathogens, Gram-negative organisms, *Klebsiella* species (34.4%) and *Pseudomonas aeruginosa* (36%) prevalence accounted more than the Gram-positive *Staphylococcus aureus* (29%) in the burn wound infection site.

The outbreak of these pathogens were associated with high death rates (60%). Almost 80% of these Gram-negative isolates were Multidrug Resistant. Nevertheless, only two isolates of *Klebsiella* species and five strains of *Pseudomonas aeruginosa* were sensitive to gentamycin, a commonly prescribed antibiotic. Also, *Staphylococcus aureus* were resistant to ampicillin and cloxacillin, but sensitive to azithromycin and pefloxacin. Although the strains are susceptible, resistant forms have developed.

The mechanism of resistance to the drugs includes reduced cell wall permeability, production of chromosomal and plasmid-mediated β -lactamase, aminoglycoside modifying enzymes and an active multidrug efflux mechanism.

The objective of the present work is to study the wound healing property on mouse cell line caused by bacterial infection using the extracts of *Morinda citrifolia*.

A mouse cell line will be developed containing epithelial fibroblasts and keratinocyte cells which is responsible for wound healing. The cell line will be infected by the burn wound pathogen and then treated using various concentration of *Morinda citrifolia* extract.

The cell viability and proliferation will be determined by MTT (3-(4,5-Dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide) assay.

Role of Indian Noni in Various Neurodegenerative Diseases

Dr. Rangadhar

Satapathy, B.H.M.S. MD

Noni Clinical Research Programme

World Noni Research Foundation

Oxidants and antioxidants play an important role in maintaining a balance between free radicals produced by metabolism or derived from environmental sources and the antioxidant system of the body. A complex natural antioxidant system exists in the biological systems, which is responsible for prevention of damage by pro oxidants (free radicals). Impaired endogenous antioxidant system favors accumulation of free radicals, which not only induces the process of lipid peroxidation but also plays a central role in neurodegeneration. Neurodegenerative disorders remain an important source of morbidity and suffering for the humankind. The role of free-radical-mediated oxidative injury in acute damages the nervous system and is also recognized in chronic neurodegenerative disorders.

The increased incidence of neurodegenerative diseases like Parkinson's diseases, Alzheimer's disease, lateral sclerosis, senile dementia etc may be attributed to a pro-oxidative environment caused by smoking, alcohol abuse, UVA and UVB radiations, air pollution as well as inappropriate nutrition. The dependence of disease severity on imbalance between oxidants and natural defenses suggests that oxidative stress plays a pivotal role in the progression of neurodegenerative diseases and could serve as a useful target for treatment. A high antioxidant food supplement can prevent or reduce the degenerative changes in brain and spinal cord by enhancing or modifying the body's endogenous antioxidant system and also by providing exogenous antioxidants from outside. Indian Noni contains all the antioxidant vitamins, important trace minerals and is rich with phytochemicals. The synergistic actions of all those ingredients just make Indian Noni a very powerful antioxidant food supplement that may help in prevention and/as a therapeutic supplement to various neurodegenerative diseases. It is our attempt through this clinical trial to put forth the evidence for involvement of free radicals in pathophysiology of neurodegenerative diseases and the action of Indian Noni in chemoprevention and/ or therapeutic purposes of various neurodegenerative diseases.

Effect of Indian Noni on Diabetic Foot with Ulcer

Dr. Ramesh Bhuta, M.S
Noni Clinical Research Programme
World Noni Research Foundation

Diabetic foot is a common problem. It is the leading cause of non-traumatic amputations of lower limb, majority of them are preceded by ulcer. Patients with diabetic foot suffers with triple jeopardy **neuropathy, ischemia.**

INFECTION :

The etio pathogenesis is a very complex one starting with evolution of human beings, the walking cycle and complex biomechanics.

These patients need to be managed under the care of multidisciplinary team.

Newer antibiotics, recent therapies and better dressing materials, have improved the clinical course of diabetic lesions to some extent, still the incidence of lower limb amputation in diabetics is increasing globally.

NONI an Herbal Food Supplement has been used in diabetic foot to augment wound healing, with a long-term perspective to try and reduce the rate of amputation.

Initial clinical experiences with NONI on 10 cases with diabetic foot ulcers were positive where noni has proved to reduce morbidity.

To Study the effect of Indian Noni on Indian Patients Suffering with Diabetes

Dr. G. Satisb Kumar, M.D

Noni Clinical Research Programme

World Noni Research Foundation

Diabetes is a major cause of morbidity and mortality in India. The burden of impaired glucose tolerance (IGT), diabetes and its complications is steadily rising all over the world including the India and U.S.A.

India has the dubious distinction of being the “DIABETES CAPITAL” of the world with an estimated >32 million of citizen with Diabetes, mostly Type2 diabetes. Hence an attempt has been made to study this problem at JEHOVAH-RAPHAH’S DIABETIC CENTRE, SECUNDERABAD. Randomly a total number of 63 patients aged between 13-55 yrs are chosen and made into four groups.

TYPE -1 DM-15 PATIENTS.

GROUP-A 9 PATIENTS.

Insulins+ Indian noni

GROUP-B 6 PATIENTS (CONTROL)

only on insulin

GROUP-C 24 PATIENTS

OHA’S (oral hypoglycemic agents) + Indian noni

GROUP-D 24 PATIENTS (CONTROL)

Only on OHA’S (oral hypoglycemic agents)

Above groups are advised to maintain regular exercise, strict dieting and regular medication.

This study group showed significantly better compliance than the control group.

Initially 6 patients showed hyperglycemia (very high blood sugar for 2 to 3 months) then gradually followed by hypoglycemia (sugar levels have come down). Surprisingly GROUP-A about 3 patients went into hypoglycemia where we have to titrate the dose where as in group b and group D (controls) shown not much of improvements.

Definitely the patients on INDIAN NONI showed better compliance, increase energy levels and preferring to adhere to treatment recommendations better.

Prevention of tissue biomolecular losses by *Morinda citrifolia* extract in Gentamicin and Mercuric chloride induced nephrotoxicity - an invitro study.

T. Anitha

and

Dr. S.Mobandass

Department of Biochemistry,

Dr.N.G.P Arts and Science College,

Kovai Medical

Centre and Research Educational Trust,

Kalapatti Road, Coimbatore, India

Kidney is the major excretory organ that is exposed to various toxic insults leading to nephrotoxicity. Gentamicin an aminoglycosidic antibiotic and Mercuric chloride a heavy metal are well established toxicants that are known to induce oxidative stress and nephrotoxicity in both experimental models and clinical trails. These are known to cause severe kidney damage after acute and chronic exposure.

An aliquot of kidney homogenate was incubated at 2mg Gentamicin and 6mM Mercuric

chloride induced nephrotoxic as evidenced by decreased activities of renal membrane markers namely ALP, ACP, LDH, Na+K+, Ca²⁺, Mg²⁺ ATPase, Catalase, with increase in LPO level by measuring the end product - MDA, with concomitant decrease in antioxidant

- Vit C, GSH and antioxidising enzymes - SOD, Cat, GPx. Simultaneous incubation of 10% *Morinda citrifolia* extract along with the homogenate reverted the nephrotoxicant induced biomolecular losses to near normal. The present study is an attempt to evaluate the nephroprotective role in *invitro* model to delineate the mechanism of action by assessing the activities of renal marker enzymes.

Agro-climatic requirements and Potential for Noni (*Morinda citrifolia* L.) Cultivation in Andaman & Nicobar Islands of India.

Dr. R. S. Singh, Ph.D

and

Dr. D. R. Singh*, Ph.D

Department of Geophysics,
Banaras Hindu University,
Varanasi-221 005 India

*Central Agricultural Research
Institute of ICAR, Port Blair-744101.
A & N Islands, India

Climate of a place is an important natural resource, which decides the type of vegetation to be grown whereas weather decides productivity of the vegetation during a season. The excess or deficiency of climatic elements (viz: rainfall, temperature, relative humidity, wind, sunshine hour, evaporation rates, rainy days, soil temperature etc.) exerts a negative influence on plant life. Because of their complex effects it is difficult to determine optimal values of these weather elements for the maximum growth and productivity of a plant.

The high valued medicinal plant noni i.e. Indian mulberry (*Morinda citrifolia* L.) is found to be successfully grown under natural condition of Andaman & Nicobar Islands of India (Singh *et al.*, 2005) having tropical humid climate. Therefore, agro meteorological parameters recorded at Central Agricultural Research Institute, in Port Blair have been subjected to preliminary analysis for quantifying the diurnal and seasonal variation of major weather parameters in relation to the natural growth of *Morinda citrifolia*. Mean monthly air temperature remain almost constant about 27°C round the year. Annual atmospheric demand of water i.e. potential evapotranspiration (PET) value over Port Blair is 1401.1 mm. The PET values were minimum (101.1 mm) in October and maximum (145.5 mm) in March. Growing degree days (heat units or thermal time) available under Port Blair conditions are worked out and considered as thermal time (°Cd) requirement of the crop for completion of the various phenological development stages of the plant.

The analysis has revealed that besides adequate annual rainfall of 3030 mm and of high annual moisture index (126 %), the plant has preference to low diurnal range of air temperature (5 to 10°C) as well as in soil temperature at various depth. Maximum temperature recorded highest (32.8°C) during April and lowest (29.7°C) during July whereas minimum temperature recorded lowest (22.9°C) during March and highest (24.8°C) during June. This indicated that the region is having narrow seasonal range (2 to 3°C) of temperature which perhaps suits plant for continuous flowering and fruit setting through out the year in the region. Prevalence of high daily mean relative humidity (79-89%) fulfils the high humidity (atmospheric moisture) requirements of the plant for its natural growth and maximum productivity. Other weather parameters like low to moderate wind speed (3.1 km/h in March to 7.3 km/h in July), bright sunshine hour

(3.3 h/day in July to 9.4 h/day in February) and medium evaporation rates (3.4 mm/day in July to 5.9 mm/day in March) are also not adverse towards the potential growth of *Morinda citrifolia*. Actual evapotranspiration (AE) worked out using climatic water balance from an established noni plant orchard is about 983 mm per year. It is clear that entire climatic features of the Islands are favourable for the commercial cultivation of *Morinda citrifolia*. The climatic data discussed in this paper is therefore may be treated as informational material as climatic requirement for growing noni plant any where else having tropical humid climate. Hence, in future our efforts should be made to identify the areas of homogeneous environment and having similar climatic features to recommend for successful cultivation of the *Morinda citrifolia* in our country.

An over view of the potentials of *Morinda citrifolia*

G. Surendiran, *Research Scholar*
and

Dr. N. Mathivanan, *Ph.D.*,

*Centre for Advanced
Studies in Botany,
University of Madras,
Guindy Campus,
Chennai, India*

Morinda citrifolia L., popularly known as 'Noni', has been used traditionally by Polynesians from many centuries. It is a small evergreen tree grows up to nine meters tall, bears flowers and fruits throughout the year. *M. citrifolia* is a native of India, but has been naturalized in many parts of the world by human activities. Though all the plant parts have been used in the treatment of various diseases, the fruit is considered important because of its wide range of therapeutic potentials such as antibacterial, antiviral, antitumor, antihelminthic, analgesic, hypotensive, anti-inflammatory, and immune enhancing effects. The use of the juice from the ripe and unripe fruits seems to be a more recent innovation, and has been amply exploited commercially in recent times.

Noni juice has been recently accepted in the European Union as a novel food. The roots are used to synthesis red dye throughout the world whereas the leaves, bark, fruits are used to produce facial creams, soaps, lotion, tea powder, etc. The bark are used to make chart wheel and to synthesis natural dye. Commercial interest in Noni has tremendously increased in recent years and there are 19 patens have already been registered in the US Patent and Trademark Office since 1976. However, there is lack of some extensive studies in several areas especially in anticancer activity. Research should be taken up to explore the therapeutic activity of *M. citrifolia* available in Kerala coast and Andaman Nicobar Islands as there was no report in Indian subcontinent.