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CONTENTS

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INSTRUCTION TO CONTRIBUTORS

* The purpose of this Journal is to provide a medium for the quick dissemination of results of research in all fields of Agriculture. Published materials will range from original research, or book reviews or developed experiences. In addition each issue may include one or two review articles.

* The manuscripts, including legends for illustrations, graphs, etc. should be neatly typed (double spaced) on uniformly sized paper, and sent in duplicate to the Editor, 'Krushi', Education & Training Division, Department of Agriculture, Peradeniya.

* Every paper will be scrutinized by a referee of the author before sending to the Editor, naming the referees.

* (Proofs sent to authors for correction should be returned within seven days of receipt.)

* In the text, reference to literature may either be indicated by the author's name, followed by year of publication in brackets, or by number, relating to the citations included in the final list of references, arranged in alphabetical order.

* Illustrations should be made with pen and indelible ink. Tables should be numbered consecutively.

* The size of each article should be less than 10 double spaced typed sheets.

* Use the metric system in all papers. Avoid national units of measure.

* Express all yields in tons per hectare (t/ha) or define in foot notes or legends any abbreviations or sumbols used in a figure or table.

* Place the name or denotation of compounds or chemicals near the unit of measure. For example: 60kg N/ha: not 60 kg/ha N.

It is far more difficult to be simple than to be complicated, far more diffiucl to sacrifice skill and cease exertion in the proper place, than to expend both indiscriminately.

-John Ruskin.

AN INTRODUCTION TO CONSERVATION FARMING.

W.L. Weerakoon, Research Officer,
P.H.D. Kusumawathie, E.O., & K.M.C. Bandara, E.O.
Agricultural Research Station, Maha Illuppallama.

Introduction:

FAO statistics show drastic geographical variation in the nutrition pattern of the worlds population. In highly industrialized countries, the daily per capita food consumption is 850 calories more than that in the developing countries. In the developing countries, the per capital nutritional level borders on starvation for the greater mass of the population. FAO estimates show roughly 60% of the families in the third world are chronically undernourished.

In the not too distant future, by the early 21st century, the world population is expected to grow to 6 thousand million. This means that we have to increase food production many fold even to maintain todays state of under nutrition.

The experience of economically developed countries is that the food problem can be solved by intensification. The growth of crop yield in those countries is the direct result of mechanisation and chemicalisation of agriculture, widening irrigation, and introduction of varieties evolved on the basis of the latest achievements in genetics and selection.

We often fail to realize that in the western world high crop yields are obtained at expense of very high inputs, For example, a doubling of corn yields in the US between 1950 to 1970 was achieved by halving inputs such as labour, nitrogen use went up 8 times, phosphate and potash increased threefold, insecticide, and herbicide inputs went up 10 to 20 times respectively.

According to Gerasimov (1975) in the mid sixties the tractor fleet in developing countries was 10.5 times less than in the advanced countries. 12 tractors per 10,000 ha. of cultivated land in the former as against 185 in the latter. The quantity of fertilizer introduced as 22 times less in developing countries. The data demonstrate the wide technological gap between these two groups of countries.

One basic method to increase food production in the developing countries has been the expansion of land under cultivation. This measure alone will not make a real impact to increase food production of a rapid growing population.[4] The world demand for cropland is greater than ever before. Simultaneously a considerable amount of cropland is being abandoned each year due to desertification. The main cause of desertification is not drought as many still believe (drought tends to exacerbate the problem) but human over-exploitation of land through over cultivatinn, overgrazing, poor irrigation practices and deforestation are some of major contributing factors to desertification: A. Considerable proportion of the estimated annual land degradation rate of 5 to 7 m. ha. occurs in the tropics where 6 to 10 m ha[6] of new land is annually being brought under cultivation. This is well expressed in an Unite Nations publication. 'Estimates of present losses of productive land suggest that world is close to one third of its arable land by the end of the century. Such a loss during a period of unprecedented population growth and increased demands for food could be disastrous.'[7]

Most of the soils in the tropics are highly erodable. Although some soils show a low to medium erodibility high rainfall erosivity and undulating slope characteristics render these soils very susceptible to water erosion.[8] Annual soil loss of 20 to 100 t/ha is not uncommon for soils cultivated to row crops because of low inherent fertility and poor nutrient distribution in the profiles, even a low level of soil loss can result in drastic reduction in soil productivity.

Continuous cultivation results in a rapid decline in soil organic matter content, the effective cation exchange capacity, reduction in water and nutrient holding capacity. As a matter of fact whole ecological environment has been changed dramatically and crop growth is adversely affected. This degradative process set in motion by man's intervention in his quest for producing more is further accentuated by accellerated soil erosion.[9]

Table 1. Declining Yields of Continuous Cropping of Peanuts, Millets or Sorghum.

5 year cropping period.	Peanuts (kernels) kg/ha	Millets (grain) kg/ha	Sorghum (grain) kg/ha
1931-1935	1015	920	540
1936-1940	785	455	330
1941-1945	700	320	105
1946-1950	320	545	90
1951-1955	510	300	Discontinued

Source: Norman, 1979.

Not only should this degradative process be stopped but immediate steps should also be taken to restore those lands that have been rendered unproductive by mismanagement. These objectives can be achieved through gradual improvement and evolutionary development of suitable technology for sustained productivity rather than through exploitation of the soil and environmental resources in favour of short term gains.

The soil degradative process set in motion by drastic changes in the soil and micro-climatic factors caused by the cultural practices that result in soil exposure and disturbance of the delicate equilibrium that exists between soil-Vegetation-climate continuum. This implies that the protective native vegetation cover should be removed in such a way that this equilibrium is least affected. Furthermore, as the soil is protected when covered by the forest canopy, it should be continuously covered after the forest cover is removed and also during the cultivation phase. This can be achieved by replacing the forest canopy by another low canopy cover or ground cover that will protect the soil against impact of raindrops and also not shade the seasonal crops.

Conservation Farming System:

It is difficult to develop a farming system that is equally applicable for different soils and agro-ecological environments. However,included in the over-all umbrella of the 'conservation farming' system are sub-systems that can be developed and adapted from oneplace to another. These sub-systems include -

Zero tillage (or no tillage) systems:

The no till technique eliminates the need for tillage by controlling weeds with minute quantities of herbicide. But unlike the plough, it leaves all the dead organic matter as a mulch on the surface of the undisturbed soil. Thus the risk of soil erosion through mechanical soil manupulation can be eliminated.

Crop Residue Mulches.

Crop residue mulch prevents rain drop impact and soil crustation, improves soil temperature and moisture regimes in favour of crop productinn, and also effectively controls weeds.

Mixed and Relay Cropping.

Traditional farming systems of growing more than one crop simultaneously having a multi-storey canopy of different maturity periods have less soil erosion an and weed problems than pure stand crops. The benefits of mix-cropping systems, as measured in terms of 'Land Equivalent Ratio' or yield per unit area per unit time, are greater under adverse conditions with low inputs than with less production constraints and with high inputs.

Live Mulch System

In-situ production of mulch materials can be achieved by planting fallows with legumes such as Centrosema, Pueraria, Macroptelium, Psophocarpus and Mucuna. Live mulch system plays an important part in maintaining fertility levels and minimising erosion

Once desirable cover has been established seasonal crops can be sown through the mulch of cover crops by suppressing them through chemical or mechanical means. Leaving the dead or live (but suppressed) mulch on the soil surface is a better measure to conserve soil and water than ploughing under as green manure.

Avenue Cropping (or Alley Cropping or Agro-Forestry) System.

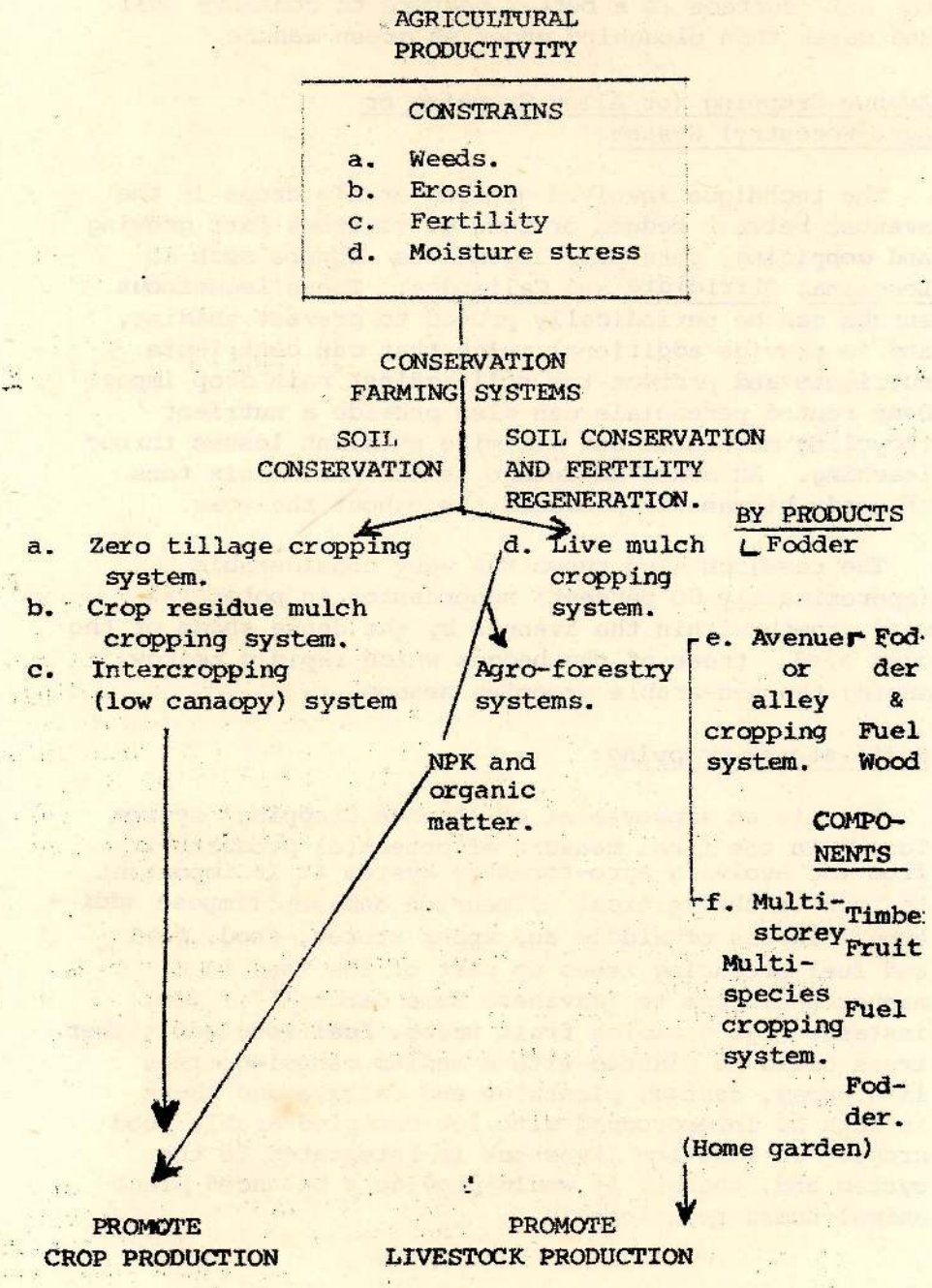
The technique involved growing arable crops in the avenues between hedges or rows of vigorous fast growing and coppicing, perennial leguminous shrubs such as Leucaena, Gliricidia and Caliandra. These leguminous shrubs can be periodically pruned to prevent shading, and to provide additional mulch that can contribute nutrients and protect the soil against rain drop impact Deep rooted perennials can also provide a nutrient recycling mechanism and minimize nutrient losses throuc leaching. An added advantage is that about six tons of woody biomass is produced throughout the year.

The research also shows the very considerable (approximately 80 percent) suppression in potential weed growth within the avenues by the dense shade of the over head trees of the hedges which rapidly regrow during the non-arable cropping season.

Multi-storey Cropping:

This is an improvement of 'Avenue Cropping' system To obtain the final measure of potential productivity from the evolving agro-forestry system it is important to turn to the vertical dimension and superimpose addi - tional layers of middle and upper storey, food, feed and fuel producing trees on part of the land in a manner analogons to 'Javanese Home Garden'[16]. For instance high canopies fruit trees, fuel wood and timber trees could be planted with a medium canopied trees like papaw, castor, plantains and cassava and these in turn be intercropped with low canopied arable food crops. In addition livestock is integrated to the system and, thereby it would provide a balanced plant-animal-human relationship.

SCHEMATIC REPRESENTATION
OF
INTEGRATED CONSERVATION FARMING SYSTEMS



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CASSAVA - AN ALTERNATIVE ENERGY FEED FOR POULTRY IN SRI LANKA.

By K. Samarasinghe, Dept.of Animal Science
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Abstract

Nutritional value of cassava is comparable to that of traditional energy feeds and it has a good potential as an alternative source of energy for poultry feeds in Sri Lanka. There are some nutritional as well as non-nutritional problems observed with cassava feeding. However, considerable efforts have been made by various workers to overcome them and to improve the nutritive value of cassava based diets. Maximum levels of inclusion in rations have been recommended but local informations on this aspect are very limited.

Introduction:

In animal production systems ordinary adopted in Sri Lanka, it is traditional to feed convential feeds such as cereals and oil cakes specially to monogastrics. Since these animals compete with humans for their basic feed ingredients specially the energy feeds and due to the strong demand, the supply of such feed ingredients are inadequate and also the prices are increased. According to the Ministry of Rural Industrial Development (1983), our poultry population and their feed requirement in 1982 were 6.25 millions and 300,000 M.T. respectively. But the total production of compounded poultry feed by B.C.C. and Oils & Fats Corporation was only 52,309 M.T. Today prices range from Rs.5040/- to Rs.5560/- per M.T. These considerations clearly emphasise the need to look beyond the traditional feed resources available so as to alleviate the strong demand. Cassava is one of the heaviest yielders of starch found in the tropics and it has been widely used as a feed and provides the major source of energy in some parts of the world including Asia. According to Wijeratne (1974) the acrage of cassava in Sri Lanka in the end of 1973 was 24,777 ha. and the average yield was 2.4 M.T./ha.

Nutritive value of cassava roots

Cassava consists of almost entirely high digestible starch (91%), it is a very good source of energy for animals. Starch of cassava is similar to that of cereals and it is completely digested by growing chicken (Szylit et al, 1978). Cassava root meal has about 1/3 the amylolitic activity of maize and its metabolizable energy value is similar to that of potatoes. The tuber NFE contains 80% starch and 20% sugar and amides (Vogt. 1966). Longe et al (1977) have reported that the apparent digestibility of cassava for chicks is slightly lower than for cereals, but not significant. The average metabolizable energy value of cassava meal for chicken is about 3045-3200 KCal/Kg (Aguirre et al, 1979; Khajarern, 1979).

Among the minerals in the tuber. P and Fe predominate with minimal amounts of Ca. It is relatively rich in Vitamin C, and contains traces of Niacin and Vitamins A, B_1, & B_2

The protein in cassava is not only very low in quantity but it is also poor in quality. The peel of cassava is much richer than the edible portions.

Problems in the use of cassava.

1. Cyanide toxicity: The cassava tuber contains small but significant amounts of cyanogenic glucosides Linamarin & Lotaustralin. Under the influence of enzyme linamarase, which is also present in the cassava plant both glucosides are hydrolized to produce HCN which is highly poisonous to humans and animals. (Oke, 1978; Onwrens, 1978)

Omole (1977) working with poultry suggested that the activity of the shell gland of the layer may be depressed by the action of HCN which combines with haemoglobin to form a non-oxygen carrying compound cyanohemoglobin. Also cytocrome oxydase activity may be reduced as HCN forms a reversible complex with the Cu of the oxydase system. Iodine availability is similarly hampered in layers fed cassava diets. The results of these reactions may be low hatchability, prolong hatching time and depressed production rate. Sub-lethal, intakes of HCN can induce goitrogenic effects also.

2. Nutritional problems.

Numerous research findings and field reports have indicated that the extensive use of cassava in poultry feeds has encountered some nutritional problems such as; low protein, mineral and vitamin contents; reduction in availability of certain mineral elements; low palatability due to dry texture high ash and crude fiber causing poor digestibility and diarrhea- enzyme inhibiting factors causing poor absorption of vitamins and minerals, poor performance and lack of dipigmentation- and contaminated micro-organisms causing aflatoxicosis (Hutagobling),1976 and 1977; Khajarern at al, 1979 and Oke 1978).

In small doses, Cyanide is detoxified to thiocynate by means of the enzyme rhodase, making use of methionin as the S donor. This amino acid therefore become the first limiting factor in cassava feeds.

Eliminating of HCN in cassava

There are different methods of detoxification developed by various scientists.

i). Decomposing the glucoside directly by heating them above 150°C.

ii). Crushing the roots to allow greater interaction between Linamarse and the glucosides, expressing the resultent products of hydrolysis.

iii) Microbial detoxification

iv). Dry soak-dry method - In Sri Lanka, Rajaguru (1972 & 1975) has found that the HCN in cassava tubers could be completely eliminated by soaking dehydrated tuber chips for more than 6 hours in water and redrying.

Additives for cassava based diets.

Efforts have been made by various researchers to overcome nutritional problems and to improve the nutritional value of cassava by supplementing nutritive as well as non-nutritive feed additives to cassava based diets. (Table 1) These additives include; proteins, synthetic amino acids, minerals, vitamins, antibiotics and antifungals, pigments, flavouring agents and hormones and enzymes.

Table 1: Effects and leves of inclusion of additives in poultry rations.

Additive	Effect	level in the ration.	animal spp.
Methionin	HCN detoxification.	0.2-0.3%	Poultry
Poultry extcreta	Correct the protein difficiency	-	Broiler
Fats & Oils	improve palatability & overcome dustiness.	5%	Broiler
Cassava leaves	Correct protein deficiency	20%	Broiler
Cassava leaves	Improve skin colour and Yolk colour	0.5%	layer
Synthetic pigments	-do-	-	layer
Vitamins	Correct the Vitamin deficiency	-	poultry
Vit. B_{12}	HCN detoxification	-	poultry

According to FAO (1980) recommendations, cassava can be included at 40% in starter ration and 60% in grower ration.

Baker et al (1976) have observed bad effects on egg production performances of layers fed high levels (60%) of cassava. However, it is reported (Montilla, 1976); Enriquez et, al, 1977) that maize in layer rations could be successfully substituted by cassava especially when it combines with rice polish. The recommended level of inclusion by FAO (1980) is 50%.

Cassava root flour can be substitued for cereals in broiler rations at levels upto 30%. But when diets are prepared in the form of pellets, it appears possible to use cassava root meal of levels upto 50% (Montilla, 1976 & 1977). However, in Thaiwan, cassava is used upto 58-60% in rations for broilers successfully (Khajarern et, al, 1979 & 1980).

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FERTILIZERS MARKETED BY THE CEYLON FERTILIZER CORPORATION

A.M.S. Perera, A.O.,
Education & Training Div.

A number of Ministries, Government Departments, State Corporations and Private Sector Institutions are involved in the import, local production, transport, handling, mixing, distributing and consumption of fertilizer in this country. The Ceylon Fertilizer Corporation is one of them. Established in 1964, with its Head Office at 294, Galle Road, Kollupitiya. Its chief functions is to import mix and distribute fertilizer at a reasonable price. To facilitate the distribution of fertilizer to retailers, the C.F.C. has established a chain of Regional Fertilizer Warehouse complexes located at Maho (15000 MT capacity), Weligama (12,500 MT) Polonnaruwa 12,500 MT) and Anuradhapura (12,500 MT) which is nearing completion. The main fertilizer complex is at Hunupitiya (80,000 MT). C.F.C. functions under the purview of the Ministry of Agricultural Development and Research. The coordinating functions including monitoring of their progress and to formulate and implement fertilizer policies at National level is carried out by the National Fertilizer Secretariat.

There are at present a large number of fertilizer mixtures in the market. The difference between some of these mixtures are marginal. The existence of so many mixtures confuse users, the farmers and small holders. In order to overcome this situation the government has reduced the number of standard fertilizer mixtures inthe country

The following fertilizer mixtures are presently marketed by the Ceyloh Fertilizer Corporation.

Subsidized Selling Price of Fertilizer at Colombo Stores.

Former Terminology.	New Terminology.	Price / M.T **
Compound Pellet		
5-15-15	5-15-15	Rs. 3,300/-
VI 3-30-10	4-30-12	Rs. 2,930/-
T D M	30-0-20	Rs. 2,920/-
Leafy vegetables and Legumes	14-21-14	Rs. 2,930/-
Fruits roots and other vegetables	16-20-12	Rs. 2,930/-
Potato & Onions	9-18-12	Rs. 3,230/-
Chillies	13-11-6	Rs. 3,430/-
Citrus	9-21-20	Rs. 2,920/-
Cocoa & Cinnamon	22-6-13-2	Rs. 2,925/-
Minor Crops (Pepper)		
Straight Fertilizers		
Sulphate of Ammonia	20-0-0	Rs. 3,600/- *
Urea	46-0-0	Rs. 2,850/-
Rock Phosphate	0-28-0	Rs. 200/-
Muriate of Potash	0-0-60	Rs. 2,750/-
Triple Super Phosphate	0-46-0	Rs. 2,850/-
Kesarite	0-0-0-24	Rs. 4,800/-
Packeted Fertilizer:		
Urea Mixture (2 Kg.) Pack.		Rs. 8/50
Urea Mixture (5 Kg.) Pack.		Rs. 20/00
S/A Mixture (2 Kg.) Pack.		Rs. 9/50
S/A Mixture (5 Kg.) Pack.		Rs. 22/50

NB:

5-15-15	- Basal mixture for paddy in the bog and half bog soils of the low country wet zone.
4-30-12	- Basal mixture for paddy in the dry zone and for soya bean.
30-0-20	- Top dressing mixture for paddy and potato in Jaffna and for soya bean in rice fields.
14-21-14	- For leguminous and leafy vegetables and for passion fruit in the dry zone.
16-20-12	- For fruit and root vegetables and immature citrus and mango in the dry zone.
9-21-20	- For mixture citrus in the dry zone and basal mixture for maize and sorghum.
22-6-13-2	- For Cinnamon and Cocoa.
14-10-10-4	- For Pepper
13-11-6	- For Chillies
9-18-12	- For onion and potato

(The fourth element found in some fertilizer mixtures refers to magnesium).

* - Not subsidized.

** - Prices as on 1.03.1985.

STUDY FINDS TREES MAY BE "TALKING"

By Warrent E. Leary
AP science writer.

Washington - You may not be able to hear it or smell it. But hidden in the rustling leaves may be the odors of trees "talking."

Scientists say they have preliminary evidence suggesting that trees may communicate with one another through airborne chemicals when they are under attack by insects.

If confirmed, the findings from the University of Washington in Seattle would mark the first time plants have been shown to emit chemicals that convey information to others and trigger responses, said the National Science Foundation, which sponsors the work.

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Drs. David F. Rhoades and Gordon H. Orians said their findings could have far-reaching implications in pest control programs when coupled with recent discoveries about the defensive systems of trees.

Dr.Jack C. Schultz of Dartmouth College announced last year that he and colleagues in New Hampshire found that several varieties of trees change the chemica composition of their leaves to ward off insects and diseases.

When under attack, Schultz said, sugar maples and oaks downgrade the nutritional content of their leaves or raise the levels of toxins to discourage pests.

Orians said in a telephone interview that these recent developments are forcing scientists to re-examine their opinions about trees, long underrated in terms of complexity and sophisticated behavior.

"It shows you don't have to have brains to be clever." Orians said.

The researchers believe trees may produce and disperse chemicals called pheromones to get their warnings to neighbors. Pheromones are well known in the insect world as sex-attractants and attack stimulators, but have not been noted in plants.

The Washington scientists in a report to the foundation, said field experiments by Rhoades found evidence that leaf damage to Sitka willow trees by western tent caterpillars and fall webworms led to changes in the nutritional quality of their leaves.

But, to the researchers' surprise, leaf quality also declined in trees up to 200 feet away that were not being assaulted by insects.

"This effect may be due to a defensive response in unattacked trees stimulated by volatile compounds emitted from attacked trees," they said.

Orians said similar reactions have been seen in red alder trees as well, "but not as strong as with the willow."

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"Presumably, this is not a reaction unique to one or a few species, but we have not yet had the opportunity to examine others." he said.

The researchers have received a new grant from the foundation to experiment with Sitka willows confined in chambers to see if they can isolate and identify chemicals that might be responsible for the trees' behavior.

"If the general hypothesis is correct," said the scientists, "it is necessary that damaged plants emit volatiles which differ quantitatively or qualitatively from those emitted by undamaged plants."

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THE PRINCIPLES OF GROWING PLANTS INDOOR

K. Wijeyathungam, Dept. of Crop Science,
Faculty of Agriculture,
University of Peradeniya.

Indoor plants not only adorn formal displays of hotels, banks, and offices but odd little plants nurtured tenderly on filing cabinets, on window sills, on bathroom shelves and in doctors waiting rooms add colour and aesthetic value to the surroundings. They are a kind of living furniture, a decoration that helps to make a room more comfortable, more friendly and less formally rigid.

Houseplants or indoor plants differ from outdoor plants only in terms of their location. They were not originally developed to grow indoor- rather many were derived from ancestors native to the shade of tropical forests . House-plants are wild plants that were domesticated

Basic consideration for creating the indoor landscape.

1. What is the environment in the room in which you want to grow plants; how does it meet the cultural requirements of your houseplants.
2. What are the structural confines in the rooms you want to decorate with plants - Survey a room's overall dimensions, the locations of windows, the placement of heating and cooling ducts, the furniture arrangement, traffic patterns, wasted or empty spaces colour and design scheme. Note where plants will fit comfortably in the rooms design to improve its appearance.
3. What is the scale and shape of the plant in relation to the scale of the room?
4. Will each plant or group of plants create a focal point within a room? Displayed in a decorative hanging basket, the arching leaves and shoots of alarge spider plant will atrract more attention than if displayed in a dull corner the far end of the room

5. Will the plant blend well with other plants in the room?

6. Does the leaf shape and plant form complement the decor of the room, Certain plants look better with the particular design fetures of a room. Almost all plants look best with an undercorated wall for a backround.

7. Will the colour of the plant blend with, add to or compete with the colour of the room?

8. How will the suports and containers blend with the other furnitures?

9. How will lighting enhance the appearance of a plant in a particular setting?

Light:

You should consider both the amount of light available and the length of time it is present in your home. The intensity and duration of light vary considerably not only from one room to another but also within a room. Light is less intense at a window with shade or curtains, another window may permit more intense light to enter, but for a shorter time . Light at a single window will vary in intensity and duration if trees or other obstructions outside block the sun's rays at certain times of the day. Furniture and reflective surfaces within a room can alter as well.

Too little light causes a plant to elongate and loose leaves that it can no longer support due to diminished photosynthesis. As the plants attempt to gather more light, the spaces of the internodes lengthen and the leaves grow broad and thin. Too much of light causes plant to wilt and their vibrant green colour to fade. Leaning plants should be rotated.

Light Categories:

Full sun: describes locations that receive as much light as possible. These can be found within 2 feet of a south facing window. This means at least 5 hours of direct sun. Very few plants survive.

Some direct sun - Areas that are brightly lit but receives less than 5 hours of direct sun during the day. Windows facing east or west and 2 feet from window locations. These are ideal for many flowering plants and some foliage plants.

Bright indirect light - Receives as much as light as possible without any direct sun, within 5 feet of a window that receives direct sun for part of the day only. Most foliage plants like this situation.

Partial shade - Receive indirect sunlight at varying intensity within 5-8 feet from a window for part of the day only. Few flowering plants but a fair number of foliage plants adopt to this lighting.

Shade - Poorly lit areas. Only a a few plants will tolerate this condition.

Plants suited for different light categories.

Full sun - Agave spp, Cactus, Opuntia, Geranium, Miniature roses, and hydrangea.

Some direct sun - Asparagus fern, Begonias, Coleus, Cyclamen, Episcia, Gardenia, Kalanchoe, Sword fern, and Gloxinia.

Bright indirect sunlight - Bird's nest fern, Button fern, Orchids, Crotons, Diffenbachia, African violets, Spider plant, Caladium, Dracena, Ficus

Partial shade - Pothos (Devil's ivy), Philodendrons.

Plants for shade - Chinease evergreen (Aglanonema), Cast iron plant

Temperature:

Temperature interacts with light, humidity and air circulation. Most plant adapt to the temperatures normally found in our homes, around 70°F (day) and 65°F (night)

Humidity:

All plants prefer 50% Humidity. A cool vapour humidifier is one way to increase humidity. Easiest way for humidifying the air is to set pots in trays or saucers filled with pebbles. Plants can be grouped together to prevent more water loss.

Soil: Soil should provide a plant with a root environment that is well draining (well aerated) and yet retains enough water and nutrients for healthy growth. Acidic soils produce wilting and dropping of leaves, alkaline soils will cause a plant to loose colour and stunt its growth. Ideal pH is from 6.5 - 7. A good all purpose potting media mixture will be of 2 parts garden soil, 1 part leaf mould, 1 part clean sand with the adition of some tile or brick pieces to increase drainage.

Part II will include how to buy a plant, day to day care and propagation.

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THE PASSION VINE GIRDLER - *Sthenias grisator*

(COLEOPTERA : CERAMBYCIDAE)

Mrs.S.F.M. Sulaiman, Research Officer,
R.A.R.C., Makndura.

The Passion vine girdler has been reported to be a serious insect pest in the Gampaha district.

The adult pest is a rather elongate black beetle, *Sthenias grisator* Fab, (see fig 1.) belonging to the order - Coleoptera and family - Cerambycidae. It is about 2 cm long with a thorax of about 8 mm wide. The head of the beetle is about 6 mm long and 4.5 mm wide. This beetle has been reported to be a pest on grape vine, and is also known to girdle economic plants like Casuarina, Mango, Jak Almond and Indian mulberry and garden plants like Croton, Bougainvillea Oleander, Cape Jasmine & Rose, and certain other wild plants as well. This pest, therefore, has a wide range of hosts.

According to Sanjeeva Raj, 1959, - *Evertamia coronaria* (Watu Sudda - S, Cape Jasmine - E) is highly preferred to other host plants, by this pest. *Evertamia coronaria* is now referred to as *Evertamia divaricata* Linne and belongs to the family - Apocyanaceae.

There is no record to any work done in Sri Lanka on this pest and no mention of this pest has been made in the major compilation of "Ceylon Crop Pests" by J.C. Hutson.

The adult pest incidence occurs during the rainy months of Dec/Jan. This pest is nocturnal in habit. Damage is caused by the neat cutting of the vine by it's powerful mandibles as shown in fig. 2. This is referred to as girdling. Sometimes, in a single night girdling might proceed till ultimately the aerial part of the vine is completely severed off the main stem. Other wise, this can happen in stages, may be in one or two nights. Partly girdled branches have also been observed. Girdling which causes eomplete severing of the vine would lead to drying up and ultimate death of the aerial part of the vine.

Review of the very limited literature available shows that this pest is nocturnal in habit and girdles the thick vine as a step prior to egg laying. After girdling, the Eggs are inserted underneath the bark of the girdled branches at night The egg takes about 8 days to hatch and the young larva that hatches out tunnels into the dry wood of the dead passion vine. The larval period is reported to be as long as one year. Dry wood is a necessity for the development of the grubs and the grubs in the dead part of the vine tunnel into the dry wood and develop. Generally, branches of a considerable thickness are chosen by the adult for egg laying so that the developing grub would have sufficient wood for development.

Sanjeeva Raj, 1959, has reported that the newly hatched larva is about 2.4 mm long and over a period of 7 months, grows to a size of 10-12 mm in length.

Our surveys of an infested field in the Gampaha district showd larval sizes ranging from 5.4 mm to 30 mm in length These larvae remain tunnelled in the dry wood of the severed passion vine. When these grubs are removed from their tunnels, they do not re-enter these tunnels. They fell off the wood and shrivel up. Therefore, they cannot be collected and reared in the laboratory for observation. However, samples of dry passion wood were collected regularly from a farmers field at Pasyala and examined. Grubs of lengths ranging from 5.4 mm - 30 mm, were collected. The pupal stage was not observed during our survey. Continued surveys may enable us to get at this stage.

Control:

This pest is nocturnal in habit and is reported to shun torch light. Therefore, hand collection will not be feasible.

Insecticide applications at frequent intervals will be uneconomical. However, painting of effective insecticides mixed with a tar base on the main thick vine could have a repelling effect. The

consistency of the tar base should be such, that it does not kill the cells of the passion vine. Painting the insecticides in this manner would not require subsequent treatments frequently and therefore will be more economical to the farmer. Efficacy of insecticides against this pest are being tested in the method described. That is, mixing of each insecticide with a tar base and painting on the main vine, which part, is most prone to damage.

The first step towards control would be to burn and destroy the damaged and dry parts of the severed vine, as these harbour the development stages of the pest. This would prevent a resurgence of the adult pest from within the farm, inthe first instance.

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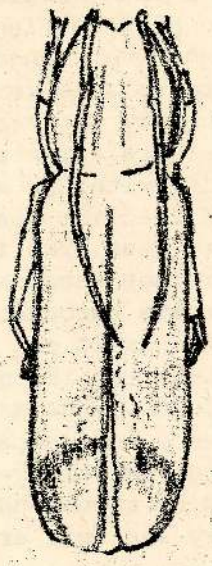
FIG. - 1.

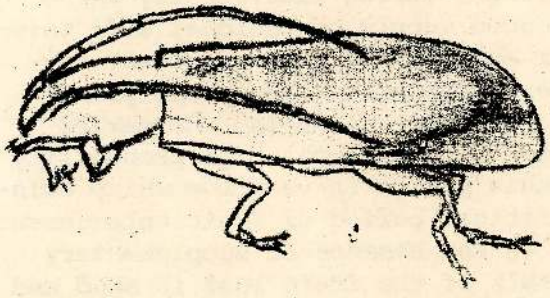
THE PASSION VINE GIRDLER

Sthenias grisator

(Adult beetle)



DORSAL VIEW ♎ (1x10)



LATERAL VIEW ♎ (1x10)

PERFORMANCE OF WOODAPPLE (PERONIA limoiña (L) Swingle) ROOT STOCK FOR ORANGE.

Jayawickrema A. Sirisena, Research Officer, R.R.S., Angunukolapelessa.

ABSTRUCT:

The woodapple (Feronia limonia (L) Swingle) rootstock has been used for grafting of orange and tested for its performance with special reference to moisture stress of the plant during the dry season in comparison with seedling orange. It has been shown that the grafted plants were not affected by water stress during the dry periods of the year, where as seedling oranges were affected. The grafted plants came into bearing within 9 months to 21 months after grafting and seedling orange did not flower till end of the 3rd year. The fruit production of grafted plants are not seasonal as seedling orange and it produces fruits throughout the year under good management. The fruit set of the grafted plants are generally profuse and the quality of the fruit juice from grafted orange is normal. This experiment provides evidence for compatibility between woodapple rootstock and orange scion. The woodapple rootstock could be recommended for orange in order to grow it in dry and semi arid zones.

PRODUCTION

In the Hambantota district of Sri Lanka the effective Maha rains terminate by the end of December and citrus flowers during late January while there is still a good supply of residual soil moisture. The flower set is generally profuse. However, with the depletion of soil moisture plants are subjected to water stress during the period from early January to late March. The probability of rains during this period is very low which coincides with the critical period of fruit enlargement and maturation. In the absence of supplementary irrigation, the bulk of the fruit load is shed and quality of the remaining fruits are impaired. During the season of severe water stress, even the whole plant begins to die off.

Most of the south-west monsoon rains are experienced by areas belonging to wet zone and intermediate zone. (Mar-July) and it is very limited in the low country dry zone including the Hambantota district. Approximately seventy percent of the total rainfall occurs during 3½ months from October to mid January followed by mild rainy spells from mid March to May.

As a result of this, soil moisture during end of Yala season (July - August) which is relatively low thereby citrus plants do not flower by the end of 2nd rainy spell. The major limitations for the successful cultivation of citrus in the dry zone is due to the lack of soil moisture. Therefore, this study was undertaken with the following objectives.

1. To study the performance of woodapple rootstock in relation to water stress.
2. To study the fruiting behaviour of grafted citrus plants.
3. To determine the quality of the citrus fruits as influenced by the woodapple rootstock.
4. To study the stock scion compatibility of the grafted plants.

Materials and Methods:

The seedlings of orange and woodapple rows were raised alternatively in the field spaced at 10'x10' . The planting was done on 20th March 1981 When woodapple seedlings reached the size of pencil thickness, they were budded with orange scions obtained from a single orange plant. Both seedling and grafted orange plants were managed under uniform management conditions to compare the growth of grafted orange plants with the normal seedling orange plants. All the plants were fertilized with the mixture of 16-20-12 which is recommended by the Dept. of Agriculture for non bearing citrus plants. Each plant was fertilized at the rate of 1/4 kg. per plant. This fertilizer was prepared by mixing Urea. Conc. Superphosphate and Muriate of Potash. Fertilizer mixture was applied twice a year in order to coincide with the two rainy spells and plants were raised without Irrigation Weeding was done by manual labour. The following observations were recorded as the scion developed

RESULTS:

Table I - Preliminary growth measurements - 53 days after grafting.

*Growth.

Chracteristics	Graftling	Watershoot
a. Height (cm)	40.6	31.5
b. Leaf length (cm) (14th leaf)	14.5	10.5
c. Leaf width (cm) (14th leaf)	9.5	5.0
d. No of leaves	18	18

* Each growth measurement is the mean of 25 readings.

Table 2 - Days to flower

Percentage of plants flowering.	Grafted plants	Seedling plants.
a. 10% of plant in flower	10 months	N.F.
b 25% of plant in flower	12 months	N.F.
c. 50% of plants in flower	15 months	N.F.
d. 100% of plants in flower	21 months	N.F.

N.F. - Not flowering.

Table 3 - Fruiting behaviour - during 1983

Month	No. of plants having only matured fruits.	No. of plants having matured fruits & flower clusters. (Contd.)
Feb.	0	0
April	25	15
June	20	10
Aug.	10	5
Oct.	06	2
Dec.	5	0

Month	No. of plants having flowers only.	No. of plants having matured fruits . Flower clusters, immature fruits.
Feb.	35	0
April	0	0
June	5	10
Aug.	8	5
Oct.	0	4
Dec.	0	0

Table 4 - Fruit yields during 1982/83/84

Sample No.	Average No. of Fruits/plant.			
	1982	1983	1984	Total
S1	4	25	35	64
S2	5	35	40	80
S3	10	50	75	135
S4	8	70	95	173
S5	15	110	86	211
S6	18	90	54	162
S7	14	60	105	179
S8	16	30	70	116

Comparison of stock growth of grafted plants, stem girth of orange seedlings and stem girth of woodapple seedlings.

Treatment	Mean.
a. Stem girth of seedling orange (cm	13.63
b. Stockgirth of grafted orange (cm)	17.2
c. Stem girth of woodapple seedlings (cm	8.9

L.S.D. P - 0.01 = 4.186

CV = 6.61

Table 5 - Skin properties of the fruits from grafted orange plant.

Sample No.	Skin feature	Peel thickness
S1	Rough	5.4
S2	Rough	6.3
S3	Medium	5.2
S4	Smooth	2.7
S5	Smooth	1.5
S6	Rough	1.0
S7	Smooth	4.2
S8	Rough	2.7

Table 6 :

Comparison of grafted plants and orange seedlings for their plant chracteristics.

Plant characteristics	Seedling	Grafted orange.
a) Percentage moisture of the leaves (dry weight basis).	21.05	96.45
b) Total number of branches.	3.682	4.852
c) Radius of the canopy area (cm)	38.075	53.746
d) Plant height (cm)	165.5	149.14
e) No of water shoots	2.24	0.58
f) No of flesh shoots	4.0	14.1
g) Leaf width (cm)	4.8	6.3
h) No of thorns	314.71	165.24

(Contd

Plant Characteristics	SE of variation	Significant or not significant
a) Percentage moisture of the leaves (dry weight basis)	10.45	***
b) Total number of branches.	0.427	*
c) Radius of the canapy area (cm)	5.4	**
d) Plant height (cm)	13.6	*
e) No of water shoots	0.360	**
f) No of flesh shoots	5.1	**
g) Leaf width (cm)	0.417	*
h) No. of thorns.	56.8	**

Each reading is a mean of the 8 samples and one sample consists of 5 plants.

*** Significant at 0.1 percent level
** " at 1.0 percent level
* " at 5.0 percent level

Discussion:

Data obtained from preliminary observations in Table - 1, shows that the everage rate of growth For 53 days is higher ingraftlingsthan in water shoots. The leaves of the graftlings were larger than those of the watershoots over 53 days.The high rate of growth and the large leaf size indicate more vigorous growth of the graftling than the watershoots.

The results from table 2 show that flowering starts within 10 months and it can go on till 21 months where as not a single plant of seedling flowered during this period.

When we observed fruiting behaviour from Table 3, it is rather different from the seedling orange plants in this area. Fruit production of the grafted plants are spread throughout the year in addition to the major season of Feb.-April. Most of the time, all three types-flowers, immature fruits and matured fruits are found in the experimental area. These results show that grafted plants are not suppressed by waterstress throughout the year, thereby flowering and food production are not limited to a certain period. These results indicate that woodapple rootstock plays a major role in escaping orange plants from water stress during dry periods.

Compatibility.

Compatibility between woodapple rootstock and orange scion had been studied. Results from the table 4 show that the stem girth of seedling orange is not significantly (1% level) different from those stock girth of the grafted orange. But seedling stem girth and stock girth of grafted plants are significantly higher than the stem girth of the woodapple seedling which were planted at the time of rootstock seedlings planting.

This results show that effect of scion is generally transferred to the rootstock and thereby woodapple rootstock is rapidly enlarged by the influence of scion. Therefore, this indicates the compatibility between the rootstock and the scion.

The results of the table 5 show that the peel thickness of fruits from grafted plants are considerably higher than the normal seedling orange which ranges from 1.5 - 3.0 cm. Surface texture is also rough in relation to seedling orange.

These observations confirm that the properties of the rootstock are transferred to the scion. Woodapple is a close relative of the citrus family, but its fruit is distinguished from the citrus fruit because it has a hard shell. Results from Table 4 and 5 confirm that there is an inter-relation process taking place between rootstock and scion.

Comparison of grafted plants and orange seedlings for their plant characteristics.

Results from Table 6 indicate that there are some morphological and physiological differences between two types of orange plants.

(a) Percentage moisture:

The moisture content of leaves of grafted plants is four times higher than in leaves from the seedling plants during the month of August 1984 (most driest month of the year). This shows that woodapple rootstock will be able to obtain ground water even during the dry period.

(b) Total number of branches.

The number of branches are significantly higher in grafted orange plants in comparison to seedling orange plants.

(c) Radius of the canopy area.

Radius of the canopy area is also significantly higher in grafted plants. These observations indicate that availability of branches for fruit production is higher in grafted plants and widespread frame of the plant facilities to produce more number of fruits from a plant.

(d) Plant height

Plant height of seedling orange plants are significantly higher than the grafted plants, thereby grafted plants become shrub or bushy which become easy for good management.

(e) Number of water shoots.

Number of water shoots are significantly higher in seedling plants than in grafted plants thereby seedlings plants produce more bearing shoots and it effects the growth of the plant.

(f) Number of flesh shoots

Number of flesh shoots are significantly higher in grafted plants. Therefore, fruit production will be higher as flesh shoots are defined as bearing shoots in citrus plants.

(g) Leaf width

Leaf width of the grafted plants are significantly higher in grafted plant, which indicate high availability of moisture and other elements for grafted plants.

(h) No of thorns.

Number of thorns are significantly less in grafted plants in comparison to seedling orange plants express their response in relation to the soil moisture stress. Most of the arid zone plants are generally thorny,i.e. indicates that they are in need of water and adaptation to survive with minimum soil moisture.

(i) The quality of the fruit juice.

There is no difference in quality of the juice produced in relation to seedling orange.
Both seedling and grafted plants din't express micro element deficiencies so far.

Acknowledgement:

I wish to thank Mr. K.G.W. Abeytunge, (R.C.I.C.) Sita-Eliya for the initial interest shown in this work. Also I wish to extend my sincere gratitutde to Dr.G.W.E. Fernando, Director, Dept. of Agriculture for encouraging me throuhout this experiment. Finally, I wish to thank Mr. P.B. Jayamanne, Research Officer, R.R.S. Angunukolapelessa, for his guidance in writing this report.

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MONTHLY STUDIES ON BUDGRAFTING IN RAMBUTAN

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&
K.P.G.A. Nanayakkara, R.O.

Rambutan (Nephelium lappaceum. L) has been propagated in Sri Lanka mainly by seed. Seedling trees, while taking a longer time to come into bearing has disadvantages such as non-uniformity of size and grade of fruit and the production of male trees. Its advantages however are the possibility of new genetic combinations, hence new genotypes. Seedling trees produce larger trunks. Grafted plants on the other hand produce true to type trees, hence making it possible to exploit particular markets with uniform type of fruits. Grafted trees are also easily manageable from the point of view of maintenance, harvesting and reduction of bird damage to fruits.

Rambutan is a seasonal crop, the fruit coming into the market in July/August period. Seedlings raised are budgrafted, but success of these grafts has been eratic at different agricultural stations. One possible reason for this was assumed to be the time of budding and this study was undertaken with budgrafting being done every month. The investigation was carried out at the Fruit Research Station, Eraminigolla in the Kegalle District.

Materials and Methods:

Seedlings raised from the 1981 crop, sown in August 1981 were used for this study. Four hundred and eighty seedlings were selected at the start of the study and randomly labelled so as to have 40 seedlings monthly for a period of one year.

The labelled seedlings were grafted at the end of each month starting December 1982, by the patch budding technique using budwood from the Malwana Special variety. The budding was done by the same budder throughout the study.

Twentyone days after budding, the buds were examined and topping of the stock was done. One week after this operation, the buddlings were potted into polythene pots using normal potting mixture.

Results and Discussion:

The budtake on and the potting of budlings worked out as a percentage of budding is shown in Table I and in Figure I & II.

TABLE I: BUD TAKE ON AND CASUALTIES OF BUDLINGS.

Month		% Bud Take on	Loss between Topping & Potting.	% Potted Plants.*
January	1983	77.5	17.5%	60
February	1983	95	22.5%	72.5
March	1983	97.5	30.3%	67.5
April	1983	100	30 %	70
May	1983	100	5 %	95
June	1983	100	15 %	85
July	1983	100	35 %	65
August	1983	100	55 %	45
September	1983	100	62.5 %	37.5
October	1983	100	27.5 %	72.5
November	1983	100	22.5%	77.5
December	1982	87.5	25.0 %	62.5

* This percent of plants where bud take on has happened will finally survive upto potting.

The casualties were evaluated at topping which was one month after budding.

It is clear that except in January, the percentage of bud take on is very high being 100% from April to November. In general it can be stated that there is no appreciable difference in the percentage of budding success.

The percentage of budlings surviving after topping is highest during May with June as a close second. It is disheartening to note very poor survival in August and September graftings which are below 50%.

Budding can thus be recommended in May and June and also Nove mber to produce a high percentage of budlings that survive upto potting.

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FIGURE 1 :

HISTOGRAM SHOWING THE PERCENTAGE OF BUD TAKE ON

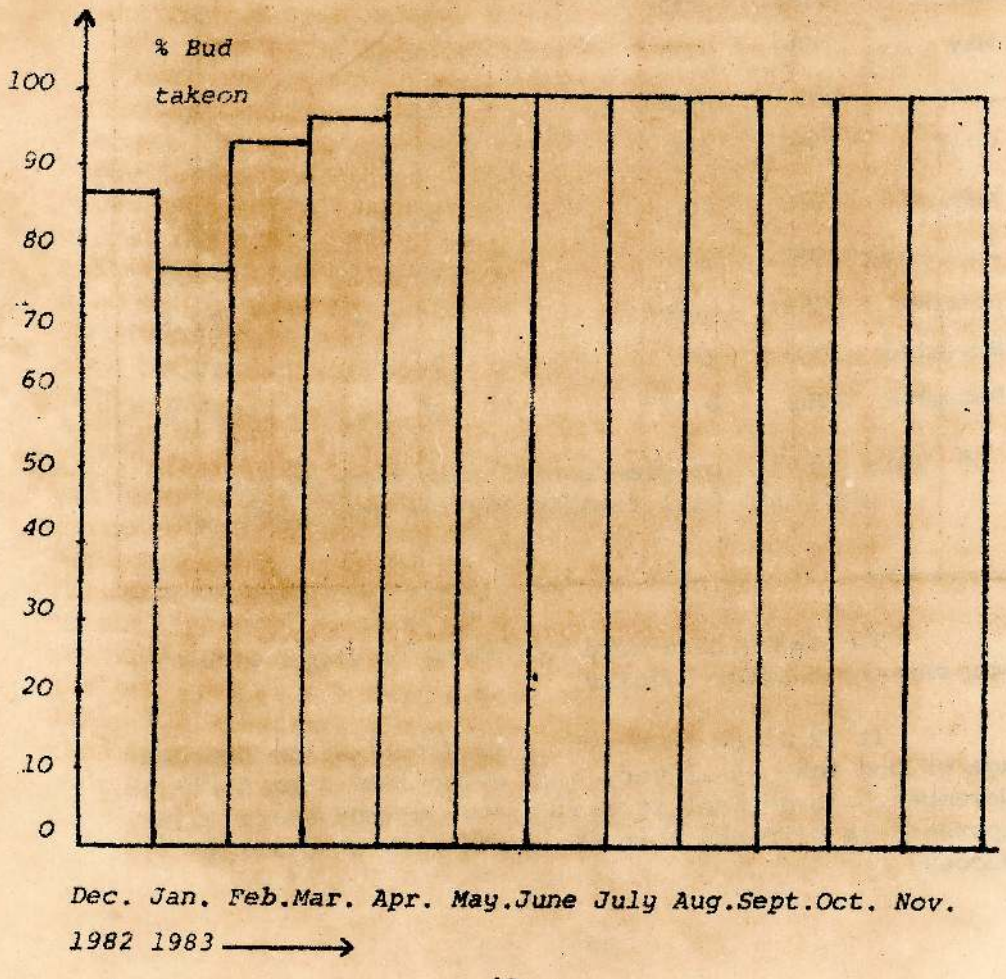
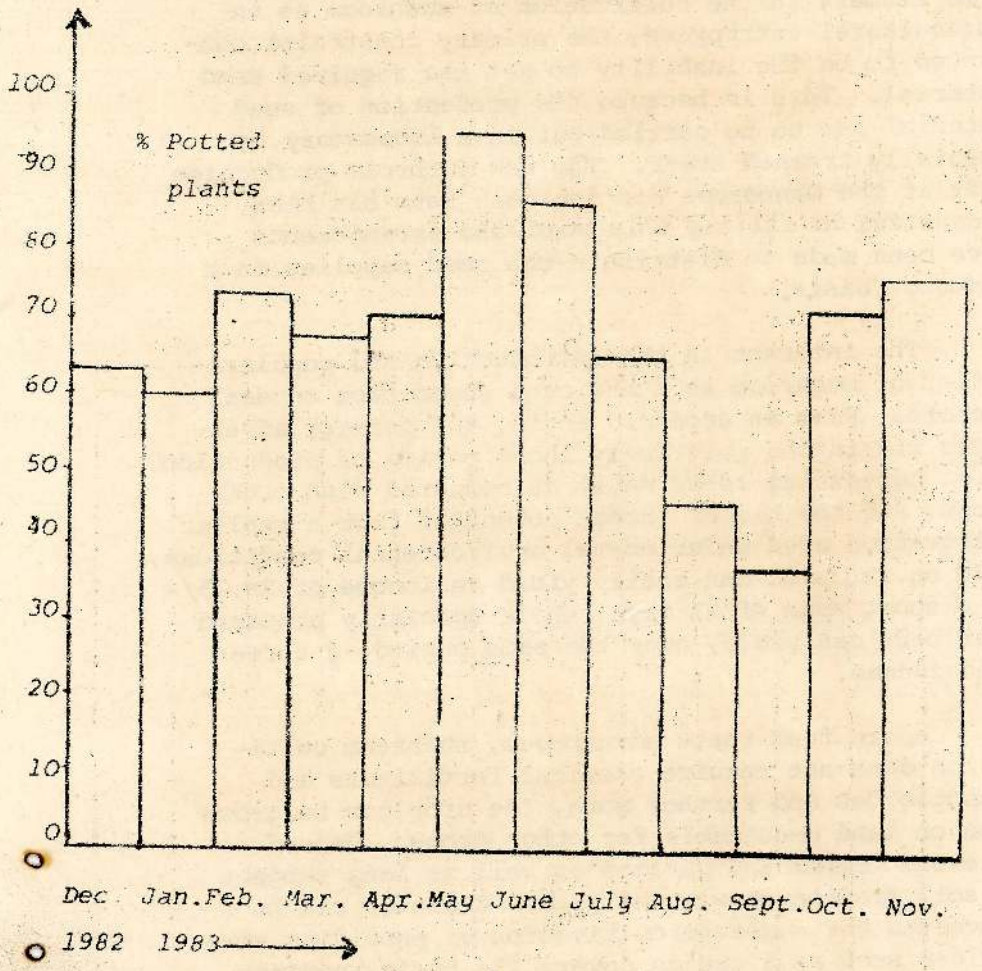


FIGURE 11 :

HISTOGRAM SHOWING THE PERCENTAGE OF SURVIVALS UPTO POTTING.



CULTIVATION OF MUSHROOMS

K.A.D.A. Alexander, A.I.
(Mushroom Project), Gannoruwa.

A unit has been established at Gannoruwa Farm by the Horticulture Division to cater to the requirements of farmers who have displayed an interest in cultivation of Mushrooms.

An interest has been evident for sometime among some farmers in the cultivation of mushroom as an agricultural enterprise, the primary constraint continued to be the inability to get the required seed material. This is because the production of seed material has to be carried out in a laboratory by specially trained staff. The new mushroom production unit at the Gannoruwa Horticulture Farm has been successful in filling this void. and arrangements have been made to distribute the seed supplies on a district basis.

The interest in the introduction and popularisation of mushroom as a new crop stems from several factors. From an economic angle, the primary advantages lie in the relatively short period of production (i.e. harvesting 14-21 days) as compared with other crops, and the higher income potential from a smaller cultivation area under normal environmental conditions, a 10 sq.ft. plot can easily yield an income of Rs.75/- in a short span of 21 days, while specially prepared tier beds can yield, over the same period, a threefold income.

Apart from these advantages, mushroom cultivation does not require chemical fertilizers and insecticides and further more, the crop can be grown even on land unsuitable for other crops. Unused firewood sheds and garages as well as land subject to soil erosion or without proper drainage can be converted for mushroom cultivation by providing some shelter such as a cadjan cover. The basic requirements for cultivation are straw discarded after threshing and some seed material.

A packet of seeds issued by the Department is priced at Rs.10.00 and is sufficient for a bed of 10 sq.ft. A bed of this size can easily provide a yield of 3½ to 4½ kilos.

Apart from the palatability of the product, research studies have revealed that mushroom has a high nutritional value. As a food, no part of the mushroom needs to be thrown away. The protein content is approximately as follows :-

Potato, Cabbage, Asparagus	- Mushroom has a protein content two-fold that of these items.
Orange	- Protein content is six-fold in mushroom.
Tomatoes, Carrot, Turnips	- Protein content is four-fold in mushroom.

In addition, the mineral salt content of mushroom is equivalent to meat and amounts to double that of all other vegetables taken as a whole. Mushroom is rich in vitamin B and D and besides, has a folic-acid content well above that of all other foods. Mushroom is also identified as a light meal suitable for diabetic patients. It also excels as a high quality substitute for providing the nutrition derived from meat and fish. Mushroom can be prepared for food in a variety of ways and this constitutes another advantage. In particular several preparations are possible to suit the requirements of patients.

In particular, mushroom deserves a primary place as an easily accessible food item for children of low income families in the dry zone, who suffer from malnutrition and digestive disorders.

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SOME ASPECTS OF PLANT GROWTH IN IMPROVED RICE VARIETIES

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Central Rice Breeding Station,
Batalagoda.

The following growth aspects were studied for ten improved varieties of rice.

(a) leaf development under direct sowing.

(b) duration from sowing to visual panicle initiation (2 mm stage), heading and maturity when transplanted and,

(c) seedling growth, tillering and leaf number under both direct sowing and transplanting.

The varieties were established in pots which were adequately fertilized to prevent nutritional disorders impairing growth. The seed rate for direct sowing was 100 kg/ha (2 bu/ac) and that for nurseries for transplanting was 500 kg/ha (10 bu/ac) Transplanting was done at a spacing of 15x15 cm. Tillering capacity of the varieties were investigated separately by giving the plants ample space (one plant per 1000 cm^2) to avoid any inter-plant competition.

In nursery the high plant density led to inter-plant competition which had adverse effects on leaf development and tillering. A remarkable difference in leaf and tiller number was noticed between nursery seedlings and direct sown seedlings (Table 1).

When the plants were established one plant per 1000 cm^2, direct sowing seemed to encourage tillering. In addition to inter-plant competition in the nursery the act of transplanting itself hampered tillering. The low panicle number per plant experienced in direct sown crops therefore is a result of inter-plant competition although the plants are operating at their fullest tillering capacity.

The number of leaves on the main culm in different varieties remained unchanged whether direct sown or transplanted. Unfurling of the first seven leaves took two to three days per leaf irrespective of variety. But, thereafter the rate of unfurling differed markedly. Longer the leaf blade longer the duration of unfurling. Short age varieties had a faster rate of unfurling indicating a rapid growth rate (Table 2).

Leaf length increased up to the third or fourth leaf before the flag leaf and decreased thereafter. In short age varieties panicle initiation took place before the unfurling of the longest leaf. The vegetative phase continued after panicle initiation until the flag leaf emerged.

Duration from sowing to visual panicle initiation differed according to the age. All varieties showed the same duration (23-25 days) from visual panicle initiation to heading. But, the maturity phase appeared variety dependent. On the average the duration of the maturity phase was about 32 days from 50% heading (Table 3).

Age extension by transplanting was due to the set back in seedling growth and the transplanting shock. Recovery from transplanting extends until two fresh leaves are produced after planting.

Table 1. Leaf and tiller number at the end of seedling stage (average of five plants.

Variety.	Leaf Number		Tiller Number.	
	Sown	Nursery.	Sown	Nursery.
Bg 276-5	8.0	6.5	4.0	1.4
Bg 34-8	7.8	6.5	4.4	1.4
Bg 34-6	7.3	5.5	5.0	2.5
Bg 94-1	7.5	5.3	4.8	2.3
Bg 304-1	7.8	5.0	3.8	1.0
Bg 380	7.8	6.0	3.2	2.6
Bg 379-2	8.0	6.7	3.8	2.0
Bg 400-1	8.0	5.5	3.8	2.0
Bg 11-11	7.8	5.5	3.0	2.4
IR 8	7.8	5.5	3.2	2.4

Table 2. Leaf development and growth stages in relation to leaf number in direct sown crops.

Variety	Age (Months)	Leaf Number at					
		First tiller.	Pl*	Visual Pl	Longest Leaf.	Total	No. days per leaf.
Bg 276-5	3	4	10	12	12	14	3.91
Bg 34-8	3	4	10	12	11	14	3.97
Bg 34-6	3½	4	10	12	11	14	4.29
Bg 94-1	3½	4	11	12	12	15	4.77
Bg 304-1	3½	5	12	13	13	16	4.56
Bg 380	4	5	12	13	13	16	4.83
Bg 379-2	4½	5	13	14	13	16	4.89
Bg 400-1	4½	5	13	15	14	16	4.84
Bg 11-11	4½	5	14	15	14	17	4.70
IR-8	4½	5	14	15	14	17	4.70

Table 3. Duration from sowing to visual panicle (2 mm), heading and maturity in transplanted crops.

Variety	Duration (in days) from sowing to		
	Visual Pl	50% Heading	Maturity
Bg 276-5	44	67	97
Bg 34-8	46	69	99
Bg 34-6	50	74	104
Bg 94-1	53	78	107
Bg 304-1	57	80	110
Bg 380	60	83	118
Bg 379-2	72	85	125
Bg 400-1	74	96	126
Bg 11-11	80	104	135
IR-8	72	86	126

BG-380 A PROMISING RICE VARIETY IN THE MAHAWELI H AREA.

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About 36,000 ha. of irrigable Paddy lands are in the Mahaweli H area. The average rice yields in the irrigable lands are high compared to the other locations of the Dry Zone, Due to insufficiency of water in most years. 3-3½ months rice varieties are cultivated during the Maha season and 3 month varieties planted during the Yala season. The most popular variety in the system H area is Bg.276/5, even though its yielding ability is considerably low compared to the 4-4½ month rice varieties.

Recently Batalagoda Central Rice Breeding Centre released Bg 380 a 4 month variety which has shown much popularity in the Hambantota district in the recent past.

Maha Illuppallama cropping systems division tested this new Bg 380 with other varieties for 3 seasons . Tests were carried out in the Mahaweli H area in farmers fields and also in the Maha Illuppallama research station. The results appear quite promising. Bg 380 gave the highest yield over the other varieties tested. No special pest and diseases were observed compared to other varieties.

In addition seedlings vigour, tillering ability was also good. This variety is also resistant to lodging.

Bg 380 is harvested within 110-112 days when transplanted, and in 117-120 days when broadcasted. Another special feature is that panicles are not visible or stand out as in other varieties, and panicles are ready to harvest before the plant dries up.

Yielding ability of Rice Varieties along with Bg 380 for several season.

Variety	82/83 Maha T*	83/84 Maha T**	84 Yala B*	84 Yala T*	Average
Bg 276/5	6766	4215	4274	6217	5368
Bg 94/1	7528	4617	3229	6804	5545
Bg 380	9240	5250	4451	8085	6757

* Farmers field. **Research Station.
T = Transplanted. B= Broadcasted.

Although it is still not officially recommended for the Mahaweli H area, farmers cultivate this variety in both Maha and Yala season. Rice yields in the Mahaweli H area may be increased further by using Bg 380.

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A SUITABLE MEDIUM FOR THE PRODUCTION OF Rhizoctonia solani INOCULUM FOR FIELD INOCULATION.

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and
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For the study of different aspects of sheath blight disease caused by Rhizoctonia solani artificial method of inoculation is necessary. The present practice is to grow the fungal colony on Potato Dextrose Agar (PDA) plates and to inoculate the leaf sheaths by placing agar blocks from the plates within the sheath. This method is very practical for lab. and greenhouse studies. However, in the field it is both cumbersome and time consuming. This study was undertaken to test for more suitable method of inoculum production.

Materials and Methods:

1. Comparison of media for Rhizoctonia solani growth.

Several inexpensive and readily available raw materials such as rice chaff, rice straw, rice dust, rice husk, rice grains, saw dust were used individually as well as in combination of media for growing Rhizoctonia solani. 5 g. of each of these or mixtures were placed with 15 ml. of distilled water in glass petridishes and were autoclaved at 15 psi. 121 C^{o} for 15 minutes. These plates and plates of potato dextrose agar (PDA) and water agar (WA) as check were then inoculated with a single sclerotium of R. solani from one of its fast growing cultures. The sclerotium was placed at the centre of the petridish and the colony growth was measured by taking its surface diameter.

The same media were tested in 250ml. conical flasks too by mixing 15 g. of the raw materials with 45 ml. distilled water and auctoclaving as before. A single sclerotium of R. solani was inoculated and the number of sclerotia formed at the end of 30 days was counted. In this experiment too, PDA and WA were used as checks. Each media was replicated three times.

Following were the media tested:-

Rice chaff
Rice straw
Rice husk
Rice grain
1.1. Rice chaff + grain
Rice chaff + agar
Rice dust
Saw dust
Water agar (WA)
Potato dextrose agar (PDA)

2. Comparison of the rate of disease development in two media.

From the results of the first experiment the most suitable medium was selected and it was compared with potato dextrose agar medium for the rate of disease development.

Potted plants were used for this experiment. Equal amounts of the media were placed within the sheaths of the rice plants and this was compared by spreading equal amounts of the medium on the water surface around the plant. The time taken to produce symptoms was noted in each of the treatments which were replicated three times.

Results:

Initially growth of the fungus was very fast in PDA and water agar media. (Table 1). But mycelial density was very low in the water agar medium. After 48 hours growth in PDA and grain medium was not significantly different. Growth on chaff + grain mixture, agar + chaff, chaff, rice dust, straw media was moderate, but very low on saw dust and husk.

The highest number of sclerotia were produced in grain medium. (Table -2) It had produced more than 3000 sclerotia. The chaff + grain mixture produced 490 sclerotia. Sclerotia production was also very low in husk, straw and saw dust media.

Disease development rate was dependant on the method of inoculation but not on the media. When medium was placed within the sheath 4 days were taken to produce symptoms. When the medium was spread on the water surface symptoms appeared after 6 days of inoculation.

Discussion:

There was no significant differences of the mycelial growth between grain and PDA medium. But grain medium could produce larger number of sclerotia than PDA This is because organism could grow only on upper surface of the PDA medium. But more space and growing surface were available in grain medium and it could therefore produce more sclerotia.

However, medium appeared to have no effect on disease development. But placing the medium within the sheath was more effective than being spread on the water surface. In our field inoculations spreading the medium on the water surface was convenient than placing medium within each and every sheath.

A medium which can produce large number of sclerotia and also easily spread out on the water surface is required for field inoculation. Using this medium was very convenient as well as very effective in getting disease incidence. Further the raw material required and the preparation of the medium does not cost very much nor is it necessary to use sophisticated equipments. Due to these reasons this medium of rice grain can be considered to be the most suitable for growing and inoculating Rhizoctonia solani in the field.

Table 1. - Growth of Rhizoctonia solani on different media.

Media.	** Colony diameter (mm)			
	After 24 hrs.	After 48 hrs	After 72 hrs.	After 96 hrs.
Chaff	11.3	35.5	84.0	84.3.
Straw	10.0	26.0	33.0	68.3
water agar	33.0	57.5	86.0	86.0*
Husk	8.6	16.0	74.6	84.0
Saw dust	7.3	11.3	12.6	13.8
Grain	16.6	86.0	86.0*	86.0*
Chaff+grain	14.3	37.6	84.0*	84.0*
P D A	25.5	85.0	85.0*	85.0*
Agar+chaff	12.3	36.6	84.0	84.0*
Rice dust	7.6	57.3	83.3	84.0*

** Initiated to produce sclerotia * Average of 3 replicates.

Table 2 - Effect of different media on Rhizoctonia solani sclerotia production.

Medium.	Growth characters.		
	Mycelial growth.	* Sclerotial initiation	Number of selerctia produced
Chaff	fast	10	94.3
Straw	Medium	24	93
Water agar	very fast	4	20.3
Husk	medium	6	17.6
Saw dust	slow	32	7
Grain	Very fast	3	> 3000
Chaff+grain	fast	3	490
P D A	very fast	3	65.6
Agar+chaff	fast	4	143.6
Rice dust	fast	4	39.6

* days after inoculation.

Efficacy of carbosulphan (Marshal 25 ST) against Thrips of rice

L. Nugaliyadde , R.O., (C.R.B.S., Batalagoda).

Objectives:

1. To find the effect of seedling pests on yield.
2. To find the minimum amount of Carbosulphan required to control seedling pests.
3. To evaluate the economics of seeding pest control.

Materials & Methods:

Location & Season : Experimental fields at CRBS, Batalagoda, Wet season (Maha) 83/84.

Treatment : Six (6)

Code	g carbosulphan ai/kg of seed paddy.	g formulated product/kg. of seed paddy.
T_o	Control	- untreated
T_1	0.50	2.00
T_2	0.75	3.00
T_3	1.00	4.00
T_4	1.25	5.00
T_R	Departmental recommendation.	

T_1, T_2, T_3, & T_4 treatments were given at the time of sowing. T_r was given at 7 days after sowing (SAW).

Seed Rate: Broadcasted at the rate of 0.1 t/ha (2 bu/ac)

Plot Size : Gross 6 x5 m
net 5 x 4 m = 20 m^2

Experimental design : RCB in three replicates

Test Variety : Bg 38 - 4 (maturity 90 days).

Date of Sowing & Harvesting. : December 9,1983.
: March 10 - 17, 1984.

Important Field operations : (1) Fertilizer:
Dept. Recommendation.

(2) Pest Control :

All expt. plots were given equal treatments from 4 weeks after sowing.

(3) Weeding:

Hand weeding.

RESULTS & DISCUSSION:

The trial was broadcasted when the thrips population was very high in the field. At seven days after sowing all plots showed a very high and uniform thrips infestation. However, at 14 DAS untreated plots had a significantly high thrips population than the treated plots. Similarly, the damage rating was very high in the untreated plot than the treated plots. The plots which received an insecticidal treatment (T_r) at 7 DAS also had a fairly high population (Table 1).

Thrips infestation also affected the plant density and leaf development. At 14 DAS the plant density and leaf number in the untreated plots (T_o) were significantly lower than the treated plots ($T_1 - T_r$). Furthermore, there was no significant difference in plant density and leaf number among the plots which received insecticidal treatment. The differences seen in the plant height in different treatment levels were not significant (Table 2).

Plant height and density were significantly low in untreated plots at 28 DAS (Table 3). Untreated plants flowered 6 days later than the treated plants indicating the effect of thrips infestation in growth and development (Table 4).

Finally, the effect of thrips infestation was evaluated as the grain yield at maturity. A significantly lower yield was obtained in the untreated plots than the treated plots. There was no difference in the yield among the different treatment levels (Table 5).

The average yield of the treated plots were 2.808 t/ha. This was 0.633 t higher than the yield of untreated plots. Therefore, it is justifiable to say that thrips infestation alone had reduced 0.633 t of paddy per ha (31.6 bu). All plots were given complete protection from 28 DAS and the plots were affected only by thrips during the 28 days from sowing.

As the cost of the lowest treatment level was Rs.60/-/ha, the net gain in the yield was very high. Considering the very high thrips infestation in the present experiment, the cost of control will be very much lower than the yield gain. The present study is not conclusive. Further clarification is needed.

TABLE 1: Thrips infestation and damage at 7 and 14 DAS[1]

Treatment	Thrips Infestation		Damage Rating[3] 14 DAS
	7 DAS	14 DAS	
T_o	10.6	29.8 a	5.6
T_1	8.1	8.5	2
T_2	10.3	10.2 bc	2
T_3	6.9	11.7 bc	2
T_4	9.1	4.3 c	2
T_r	10.8	17.9 b	4.3

Means in a column followed by a common letter are not significantly different at the 5% leavel by DMRT.

Means number of thrips (adult and larvae) per seeding Average of 10 plant per plot.

Standard Evaluation System for rice. IRRI,1980.

Average of 3 replicate .

TABLE 2: Observation on seedling density leaf number and plant height at 14 DAS[1].

Treatment.	Density[2] Seedling/0.5m^2	No Leaves/ Plant[2]	Plant Height[2] cm.
T_o	65.3 a	3.1 a	23.6
T_1	87.6 b	4.5 b	22.3
T_2	105.3 b	4.4 b	22.9
T_3	99.3 b	4.9 b	24.7
T_4	103.5 b	4.8 b	21.5
T_r	101.3 b	4.5 b	21.8

[1] Means are not significantly different.

[2] Means followed by a common letter are not significantly different at 5% level by DMRT

Averaage 10 samples per plot.

TABLE 3: Observation on plant height and plant density at 28 DAS[1].

Treatment	Plant Height cm.	Tillers/0.5 m^2 [2]
T_o	34.1 a	101 a
T_1	39.9 b	176 c
T_2	43.1 b	157 b
T_3	39.7 b	151 b
T_4	41.8 b	159 bc
T_r	41.3 b	148 b

Average of 10 samples/plot.

Means followed by a common letter are not significantly different at 5% level by DMRT.

TABLE 4: Maturity (number of days from sowing to 100% flowering).

Treatment	Maturity (days
T_o	71
T_1	65
T_2	65
T_3	65
T_4	65
T_r	65

TABLE 5: Effect of seeding pests (thrips) on the yield and the economy of seeding pest control.

Treatment	Yield t/ha.	Treatment cost[2] Rs/ha.
T_o	2.175 a	--
T_1	2.954 b	60.00
T_2	2.761 b	90.00
T_3	2.797 b	120.00
T_4	2.875 b	150.00
T_r	2.653 b	

Means followed by a common letter are not significantly different at the 5% level by DMRT.

Treatment cost for Marshal 25 ST were calculated at the rate of Rs.1,200/Kg/ai. (Ref. FMC/SL/RS/3 of May 2, 1984.)

EFFECT OF PACKING MATERIAL AND MOISTURE CONTENT OF SEED ON SEED VIABILITY OF RICE IN STORAGE.

By

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(Extract from an article that is to appear in a leading Agricultural Journal soon.)

Effect of packing material (Polythene, Pricked Polythene, Polysack and Gunny) and the moisture content of seed at packing (12% and 14%) on seed viability of rice in storage was studied. Two rice varieties, Bw.78 and Bg.400-1 were used in the study.

Three way interaction effect of packing material x moisture content x time of storage and the two way interaction effects of packing material x moisture content, packing material x time of storage and variety x time of storage were found to be significant.

If gunny is used as the packing material in storage, 2½ months old seed with 95% viability at packing could retain not less than 80% of their viability for a period of about 5 months and a week despite the moisture content (12% and 14%) of seeds at packing. If seed paddy is packed in ploythene and polysack, the moisture content of seed at packing was the critical factor on which the time of storage was dependent upon with regard to seed viability. Higher the moisture content of seed at packing higher the rate of viability loss and shorter the time of storage of seed paddy in polythene. This appeared to be other way round in polysack. However, this unexpected behaviour of polysack is subject to confirmation by further investigations. When 2½ months old and 95% viable seeds with 12% and 14% moisture were packed in polythene, seeds could retain not less than 80% of their viability for a period of about 6½ and 3 months, respectively.

Seed paddy loose its viability with time in storage. However, the rate of viability loss is dependent upon the combine effect of the packing material and the moisture content of seed at packing despite the varieties used. Varietal differences in seed viability could also be observed after about 6 months of storage despite the packing material and the moisture content of seed at packing.

Higher the moisture content of seed at packing, shorter the time of storage that could retain above 80% of seed viability when seed was packed in polythene. If seed paddy is packed in gunny, the time of storage that could retain above 80% of seed viability no longer dependent upon the moisture content of seed at packing since moisture exchange through gunny is possible.

It is evident that packing the seed with 12% moisture in polythene will enable the seed harvested in yala and maha seasons to be used as seed paddy after one season of storage in following yala and maha seasons, respectively with no risk.

Agricultural Department Press, Peradeniya, Sri Lanka