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"Everything that is written is meant either to please or instruct. The second objective is difficult to achieve without achieving the first"

- Sidney Smith -

CONTENTS

JAK-PROPAGATION BY SHOOTS

N.B. Abeysinghe,
Asst. Director of Agriculture, Kegalle.

The only known method of vegetative propagation of jak at present is bud-grafting. Shoots have been successfully rooted by the method described below:-

Materials needed:

Tubular polythene film - gauge 150 (20 cm. wide, 60 to 80 cm long).
Stick 1 cm thick, 40 to 50 cm. long.
Thin G.I. wire, pieces 10 cm. long.
Potting mixture made up of loamy soil and cattle manure or compost (in equal parts)
Jak shoots from a selected mother tree.

Selection of shoots:

Select healthy fast-growing water shoots from selected mother plant. A shoot should have only 3 to 5 leaves.

Removing water shoot from mother tree:

Use a heavy sharp knife. Cut the shoot with the heel in one clear cut. Do not damage the heel. If shoots have to be transported over a time of more than a few minutes put shoots in a polythene bag, sprinkle a little water into the bag and tie to make it air tight.

Potting the jak shoot:

Tie up or seal one end of the piece of polythene film.
Put in potting mixture to a height of 20 cm in the polythene bag. The potting mixture should be moistened to field capacity before putting into bag.
Press fairly well.
Plant jak shoot in soil in the bag at a depth of 3 to 4 cm. and press the soil well.
Push the stick into the soil 3 to 4 cm. away from the jak shoot. The tip of the stick should be 8 cm above the top leaf of the jak shoot.

Tie up the bag to be air tight slightly above the stick with wire.
Keep potted shoot in medium shade.

Hardening of Rooted shoots

Rooting will take place in two months. After one new leaf has appeared and turned dark green open top end of bag, blow into bag and tie up. Repeat three to four times at three-day intervals.

After that leave the bag open for 30 minutes each day and tie up. Do this for 4 or 5 days. Increase the time the bag is kept open to hours each day for 3 days. If shoot does not wither keep the bag open for a days before transplanting. Watering at be done as and when requird.

THE LAW OF LEARNING

Any connection, nervous or mental, which has once been made, tends to recur.

The strength of that tendency depends upon the INTENSITY, FREQUENCY, and RECENCY of the connection in past experience.

B A B O O S

1. General:

Bamboos of many different kinds form one of the most striking features of tropical vegetation. They vary considerably in size, and character; some growing only a few feet in height, others 100 feet or more with stout erect stumps, whilst other are climbers or straggling shrubs. The smaller kinds are usually suited only to the higher altitude or sub-tropical conditions and the larger species thrive best at the lower elevations. All like a sheltered and moist locality and deep retentive soil. Bamboos are readily propagated in rainy weather by suckers, divisions of the root stock or by rooting mature joints with buds.

2. Different species of bamboos that can be substituted for construction timber are :

2:1 Bambusa Vulgaris (Common bamboo)

Yellow or golden bamboo. Found in Sri Lanka and tropics. A very beautiful species. The stems grow up to 35-50 feet and one pale yellow in colour streaked with green and 3-4 inches in diameter. Most useful for scaffolding, building, plant pots etc. Thrives best on river banks upto 4,500 ft. elevation in valleys and along water ways such as streams and rivers.

2:2 Bambusa Aspera (Building bamboo). Origin Java.

Stems are dark green in colour and very strong, They grow more than 100 feet long with about 8-10 inches in diameter. Well suited for pole, used in construction.

2:3 Bambusa Nigra (Black bamboo)

Black in colour. Stemps grow upto 35-50 feet in height and 3 - 4 inches in diameter. Most useful for rafters and reepers of simple houses.

2:4 Dendrocalamus membransceous

Most useful for poles, used in construction.

2: Dendrocalamus gignateus (Giant Bamboo)

Origin - Burma. Stems are dark green in colour. A magnificient species, attaining a height of over 100 feet producing so many shoots so that each clump is about 40-50 ft. in diameter. The stems are 10 inches or more in diameter. Young shoots grow at the rate of a foot a day. The largest of all bamboos. Used for building (wall plates, rafters and reepers of simple houses), plant pots, water spouting, umbrella stands etc.

2:6 Dandrocalamus strictus

This is a species recently introduced from India. It is a small sized green coloured bamboo where the cenral cavity is absent in the lower parts of the stem. It is also referred to as male Bamboo. This species has a very wide range of distribution in India, hence should prove successful in most parts of the Island, upto an elevation of 4000 ft. above the sea level.

Male Bamboo has already been grown in the vicinity of the Valachchanai Paper Factory as a source of paper pulp. Successful nursery work has been done in the Wet Zone..Currently the Tea Research Institute is carrying out some trials with this species in Tea land. Besides the use as paper pulp this species can also be used widely in other forms such as furniture, low cost housing etc.

3. Propagation

Bamboos are easily propagated by suckers, divisions of root stock or by rooting mature joints with buds. Some species are propagated by seed too.

3:1 Vegetative propagation:

Semi matured stems when burried horizontally in moist sand beds, will shoot out at the nodes. (In the Royal Botanical Gardens the stems are buried in the river banks for germination). When there is sufficient moisture, the buds at the nodes will germinate. When the shoot is about 6-9 inches, this may be removed from the stem along with the roots, without damaging it, with a sharp knife. This can be potted using a potting mixture of 10 parts of good garden soil, 4 parts of leaf mould and 6 parts of sand. It can even be planted straight away in the garden.

ote: The nursery men at R.B.G. have noticed even the bud t the node of the fresh bamboo planting pot to germinate, with watering of the plant in the pot. When this bud grow o the height of 6"-9" inches even this is carefully re- oved and potted

3:2 Propagation by Seed.

Some species are propagated by Seed. e.g.- Dendrocalamus gigantens (Giant bamboo), Dendrocalamus strictus.

But the collection of seeds is difficult due to its height and also the seeds are despersed all over the place under the tree as the inflorescence mature and burst. In the R.B.Gs, the seedlings under the trees are collected once the seeds germinate with the rains.

3:3 Seed Supply:

There is no known place in Sri Lanka where bamboo seeds can be obtained. Seeds may be obtained from the following sources. Even from these courses the supply is erratic as Bamboo flowers only a year prior to their death. The age of the bamboo vary from 25-40 years.

1. Pratap Nursing & Seed Stores.
   P.O. Premuagar,
   Dehra Dun G U P,
   India.

2. Treseders Nurseries (Traro) Ltd.,
   Resugya Farm Nursery,
   St. Ermo, Turo, Cornwell,
   England T R I I DQ.

3. Hiller's Nurseries (Wischester) Ltd.,
   Winchester, Hants.

3:4 Nursery Techniques:

The seeds are first sown in prepared beds 4'x40' in rows two or three inches apart using about 8'- 16 ounces per bed. The seeds are prone to rodent attack, hence the beds must be protected using a wire netting fence, dug a few inches to the ground. The beds should be watered and shaded if the sun is too intense.

The seedlings when 6"-8" high are lifted in two's or three's with a ball of earth and planted out in the outer nursery at spacing about 1 - 1½ foot from each other. These should be allowed to develop a healthy clump 6 inches wide at the base and 5' - 6' in height.

Seedlings form the nursery beds can also be planted in polythene bags 9" x 9" (300 gauge) or the seeds can be sown directly into the bags after carrying out a trial germination to determine the number of seeds which will give two seedlings per bag.

4. Planting technique:

During the planting season the small clumps are uprooted. The root system of the uprooted clumps are covered in jutehessian or gunny bags after cutting back the short to 3-4 ft. level for easiness of transport. These clumps are removed to the planting area and planted in pits 1'x1'1½' spaced at 15 x 15 ft. (194 clumps per acre) or 20'x20' (109 clumps per acre). Avoid water logged sites. It is the experience that, where there is a time lag between uprooting the clumps at the nursery and planting out in the field, mortality is high. In such situations bamboo plants grown in polythene bags gives better results. Weeding should be done as and when necessary. Precautions should be taken against fire during the dry season.

5. Growth rate and tending:

The planted clump reaches adult size after about the 10th year. During intervening period cleaning of clump is necessary to remove congestion and misshaped stems. After reaching maturity the clumps are harvested about every 4 years to remove the old stems, leaving sufficient to withstand the wind and regenerate new stems.

6. Yield:

After maturity each acre if worked on a cycle of 4 or 5 years should yield 1/2 to 1 ton per acre per annum.

REFERENCES:

1. Mac.Millan H.F., Tropical Planting and Gardening with Special reference to Ceylon.

2. The Sri Lanka Forester, Vol.X Nos.3 and 4 (New Series) (109-110) - 1972.

PRESENT INFORMATION SITUATION ON NEMATODE PROBLEMS ON ONION.

By

*M.M. Nugaliyadda*and H.M. Rohini K. Ekanayake***

Division of Entomology, CARI, Gannoruwa, Peradeniya.

An unidentified disease that plagued the onion crop for several years (especially in the Maha Season) and resulted in severe yield reductions was reported in June, 1980 by Dr. N. Wignarajah (Half-yearly report submitted to D.D.A. (Research). The symptoms observed in onion indicated the possibility of nematode attack. During the course of his assessments, he sent samples to Mr. G. Gunasingham, E.O., (Plant Pathology), Thirunelvelly and to the Division of Entomology, C.A.R.I., Peradeniya. The disease symptoms indicated that the causal agent could be the onion stem and bulb nematode, Ditylenchus dipsaci. The leaves became pale in colour and showed twisting or spiralling symptoms. On examination Mr. Gunasingham confirmed the presence of two fungi, Fusarium sp. and Alternaria sp. Subsequently, in thesamples sent to C.A.R.I., Peradeniya, the plants were observed to be infested by some plant parasitic nematodes.

During this period, the Division of Entomology, CARI initiated nematological research. In November, 1979, Prof. F. Lamberti from Italy arrived as a FAO Consultant in Plant Nematology, and the onion problem was posed to him. On analysis of soil and plant material of onion Prof. Lamberti determined that the major onion nematode, Ditylenchus dipsaci was absent and only a few foliar nematodes, Aphelenchoides sp. were present in onion leaves. During an island-wide survey of plant parasitic nematodes carried out by Prof. Lamberti and Ekanayake, a wide variety of crops including onion from all the agroclimatic regions of Sri Lanka were examined. In this survey no Ditylenchus species could be identified.

In order to determine the damage caused by nematodes in onion cultivation Prof. Lamberti and the Division of Entomology, CARI conducted two nematicidal experiments in Trincomalee (May-August, 1980 and Nov. 1980 - Jan. 1981). The role of nematode as a casual agent of onion bulb rot could not be confirmed in these experiments, but beneficial effects of carbofuran application were obtained. Hence a tentative recommendation of carbofuran for a suspected nematode problem was given due its ease of application and availability. This was a blanket recommendation for

nematode problem. Investigations are required to determine the appropriate dose of nematicide for different crops and nematode species.

During a period of two years (1982-1984) several samples of onion plants with suspected nematode problems from Thirunelvelly, Kalpitiya, Ratnapura, Matale, Kandy, Maha-Illuppallama, Jaffna and Angunakolapelessa were examined. None of them were found to be infested with Ditylenchos dipsaci. Nematodes extracted from these samples were sent to the Institute of Nematology, Bari, Italy for confirmation of identity of D. dipsaci. The nematodes were identified as saprophagous. This leaves us with a lot of unanswered questions on the nematode problem on onion. Hence, the present need is a more basic approach to identify the nematodes or pathogens involved.

From International Agricultural Research Centres

1. High Yielding Manioc

   The International Institute of Tropical Agriculture (IITA) (in Nigeria), in a series of trials had found, the variety TMS 30555 to Yield 69 tons/Ha.

2. The high Yielding Variety of sweet Potato from IITA, TIS 1499 has produced 32.5 tons/Ha. This is a 90 day variety.

3. Most Soya bean varieties selected for low elevations higher than 1000 M. One variety that matured in less than 120 days at low elecation took 300 days to mature at a mid altitude location. In a trial 182 lines were tested and 22 lines gave Yield exceeding 2 tons/ha when grown between 1000-1500 M above sea level. The best two yielders were TGx 888-49C and TDx 536 - 02D, yielding more than 2.1 tons/Ha.

4. In a study on the performance of plantains it was observed that,

   1. Taller Pseudostems produce leaves at a faster rate, flower eailier and produce heavier infructescenes which need more time to mature.

   2. High yield is faboured by vigorous initial grouth of the planted sucker.

ON THE YIELD & QUALITY OF GROUNDNUTS

(Arachis hypogaea)

Mrs. B. Regunathan, (R.O., Grain Legumes & Oil Seed Crops) R.R.C. Kilinochchi.

Introduction:

Continuous cropping leads to the depletion of available soil nutrients. Heavy rains and overirrigation may leach nutrients, away from the root zone of crops. Such nutrient losses must be remedied by the addition of fertilizer in correct amounts.

Carbon (C) is a major constituent of Carbohydrates, proteins and fats. Plants absorb carbon as carbondioxide (CO_2) from the atmosphere. The elements other than carbon oxygen and hydrogen are absorbed by plants from the soil water solution in the soil.

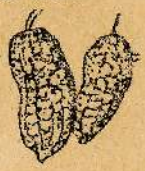
Important nutrient Elements:

1. Nitrogen (N) is essential to synthesis proteins such as storage proteins, enzymes, protoplasm and so on. Nitrogen imparts a green colour to the leaves and encourages rapid growth, increases plant hight, branching or tillering and the size of leaves and grains. Adequate availability of nitrogen improves quantity and quality of the crop yield Nitrogen can be supplied by adding ammonium sulphate (21% N), urea 46% N) and other sources that contain Nitrogen. Organic matter such as compost and cowdung contains Nitrogen in small amounts.

2. Phosphorus (P) is an important constitutes of protoplasm and proteins. To enhence growth and get better yields phophorus is required in adequate amounts. Stunted growth of plants is caused by phosphorus deficiency.

Phosphorous encourages development of the root system, making the crop tolerant to drought. Branching, flowering and fruiting are enhanced by phosphorus. Most phosphorus fertilizes do not dissolve easily. Therefore, they are applied mainly as basal fertilizers. Phosphorus is absorbed more during the flowering time. Irrigation water may have some phosphorus. When the Eh of the soil increases the availability of phosphorus is better. Concentrated super phosphate containing 50% P_2O_5 is an important phosphatic fertilizer.

3. Potassium (K) helps to build up carbohydrates and proteins. K imposes resistance to diseases and unfavourable circumstances. Branching, size and weight of grains are increased by potassium. The respiratory machanism of plant is controlled by potassium. Muriate of potash containing 50-60% K_2O is a common source of K.



In groundnuts thirty percent of the cotyledonary protein is utilized during germination and 75% in the next seven days. More nitrogen is required during flowering and fruiting. Roughly 5 kg N/ha/day is utilized as the crop matures. Nitrogen in the other parts of the plant is mobilized and translocated to the cotyledons of the seed. Application of nitrogen affects the rhizobial activity. Application of nitorgen improves the yield of groundnuts but the amount to be used varies with the amount already present in the soil. In soils where nodulation is very poor the application of nitrogen fertilizer is essential. In the other soils, the amount to be applied has to be determined by soil analysis.Phosphorus is readily conducted to plant parts where it is required more. If less phosphorus is absorbed through the root system during maturity phosphorus in the leaves and other organs are translocated to the grain or seed. P is required in very large amounts during maturity. About 85% of the phosphorus absorbed is stored in found in the seeds. Dry Zone soils are generally deficient in phosphorus.

Potassium is found in different proportions in all parts of plants. Highest amounts are found in the stems and lower leaves. This element is very quickly translocated and the cotyledonary reserve too is fully utilized in germination.

4. Sulphur is an important element in the protoplasm. Sulphur increases the number of pods attached to the plant at harvest by making the pegs stronger. Sulphur influences the uptake of nitrogen and improves the oil content of seed. Sulphur is present in the fertilizers which are used to supply other elements. e.g. Ammonium Sulphate, Super Phosphate, Gypsum and so on. The effects of such fertilizers depend partially on their sulphur content. Sulphur is absorbed from sulphur based fungicides through the leaves. It is also supplied by rains and irrigation water. Hence sulphur fertilizers are not in use.

5. Calcium plays an important role in the activity of cells. It activates breakdown of carbohydrates into simpler chemicals. It enhances growth of roots. It is a relatively immobile element in the plant body. Calcium deficiency causes abortion of developing embryos. Calcium requirement of the seed is met by absorbtion through developing pods themselves. Therefore calcium must be present in adequate quantities in the fruiting zone. If calcium is deficient the percentage of empties and half-filled pods will be high and the shelling percentage will be low. Hence, it is possible to detect deficiency only after harvest.

The form of calcium to be applied to correct deficiency is also important. The nuetral salt like calcium sulphate (gypsum) is favourable.

Powdered calcium carbonate (lime stone) is also widely used. Lime stone increases the soil pH. Excess calcium inhibits absorbtion of other minonutrients. Gypsum 200 - 500 kg/ha or limestone 2000 - 10,000 kg/ha is used. The varieties with larger seeds require more calcium. Lime stone powder is applied 3 - 4 weeks before planting and ploughed into the soil. Gypsum dust is applied at the time of flowering. Darkening of plumule at the base is also a condition of calcium deficiency.

The viability of seed from a calcium deficient crop is poor. Those which germinate die or seedling growth is stunted. The leaf shape will be irregular. The varieties with larger seeds are more susceptible, to calcium deficiency.

6. Magnesium (mg) helps synthesis of chlorophyll, carbohydrates and fats. Magnesium deficiency reduces tolerance to cercospora leaf spot disease and plants show maturity before actual maturity. Yellowing of lower leaves and reddish brown margins are symptoms of magnesium deficiency. In magnesium rich soils the availability of calcium is low. Dolomitic lime stone supplies both calcium and magnesium. Magnesium in the cotyledons is utilized at germination. Magnesium is required in large amounts at flowering. Magnesium is much more mobile than calcium in the plant body but less mobile than potassium and phosphorus.

7. Iron (Fe) is required for chlorophyll formation. Deficiency of iron causes yellowing of leaves. Availability of iron is low in soils of high pH.

The trace elements required by groundnuts are boron (B (Bo), Manganese (Mn), Copper (Cu) and Zinc (Zn). Availability of manganese depends on the availability of iron.

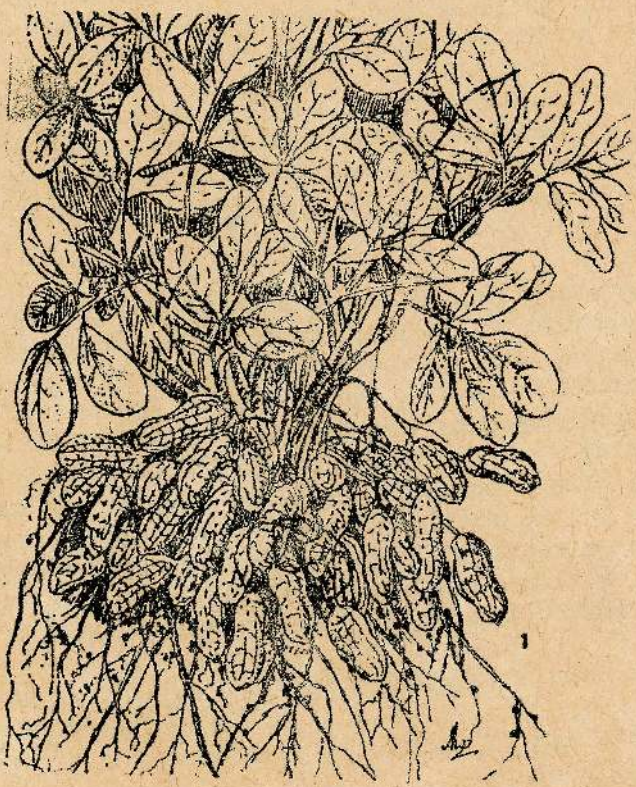
.8. Manganese is an element of the enzymes involved in the oxidation reactions. Mangenese activates the enzyme catalase. Deficiency of Manganese causes yellowing or burning of young leaves. Leaves absorb manganese rapidly.

9. Boron deficiency causes, discolouration of cotyledons and embryo, reduced seed viability and deformation of leaves. Blackening and cracking of internodes, short thick roots and profuse nodulation are other symptoms. Poor efficiency of nodules, delayed flowering, less number of flowers, excessive formation of one-seeded pods and cracked pods are also simptoms of boron deficiency. Early runner varieties are susceptible to Boron deficiency.

10. Copper deficiency reduces yield and its quality. Zinc deficiency causes bronzing of upper leaves.

Remedial Measures:

Deficiency diseases can be controlled by soil or foliar application of the needed nutrient element.



Aeschynomene indica ,L. "Cani it be considered a.Paddy Weed Anylonger"

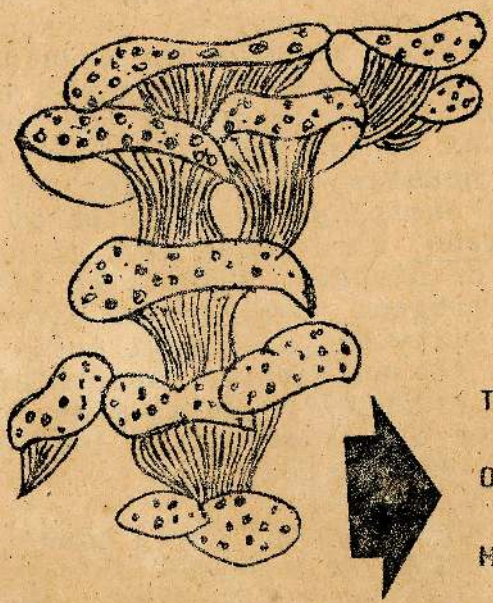
N Senanayake
Regional Research Station,
Bombuwela

Aeschynomeme indica is a broadleaved paddy weed found in lowland paddy fields in the low country wet zone. In some areas it is called by the common name "Diyasiyambala". Field observations during the past indicate that, even though it compete with rice plants, the rice plants are more greener in colour under these plants than in the rest of the fields This made us to suspect it to be a nitrogen fixing plant, since it belong to the family Leguminoceae. Closer observations of this plant have shown that it has some irregular swellings at the base of the plant, which when pinched or cut showing a pink colout which may be due to its nitrogen fixation. Observing the underground plant parts, it was found that there are nodules at the stem base just below tha soil surface, and on the superficial roots mostly. In established nitrogen fixing nodules the nodular activity is found by cutting the nodules and if it is pink in colour one could assume that it is fixing nitrogen actively. The root nodules, stem nodules and the irregular swellings on the stem of Aeschynomene also shows pink in colour when cut or pinched, suspecting its ability to fix nitrogen, However the nitrogen fixing ability of this plant needs establishment by ARA analysis. The procedure how these fixed nitrogen is made available to the rice plant, for it to look greener is yet to established.

Under normal field conditions this plant grow to a height of 4-5 feet and has a very sparse foliage. Therefore it will provide high light penetration to the rice canopy and compete for very little space with rice. Further since it

has a tap root system competition for nutrients is also low as the rhizosphere of the two plants are at two different levels. Therefore the competition rendered by this plant on rice in minimum. This suggests that it can be grown along with the rice or could be grown on the bunds and later put to the field as a nitrogen supplement at the top dressing stage of the rice. But the threshould population levels needs to be worked out. If the suspected nitrogen fixing ability of this plant could be established its use a s a nitrogen supplement wither by growing it as a fallow crop or as a relay crop with paddy is immeasurable.

Further investigations on how much nitrogen a plant can fix, and ways of increasing its nitrogen fixing activity need estensive research. Therefore this broadleaved weed hitherto a weed in the paddy fields, could further be considered a weed?



This is

Oyster

Mushroom.

A METHOD TO PREVENT IRON TOXICITY IN PADDY FIELDS.

J.N.T. Paaris (Agricultural Officer), A.C.de Mel (Subject Matter Officer).
District Agricultural Office - Gampaha.

Introduction:

Symptoms of iron toxicity can be observed in rice plants growing in paddy fields at the bottom of hills in wet zone areas. Depending on its severity and several other factors, rice yield can be reduced drastically. In the Walpita Segment of Gampaha district, iron toxicity can be observed in an extent of about 300 hectares.

The extent of damage caused by iron toxicity depends on the period and amount of rainfall received during the season, the amount of water that seeps from the adjoining highland and the rice variety grown in the field.

An effort was made to drain away the excess water to reduce iron toxicity. Encouraging results were obtained during the two seasons, the trial was done.

Drainage of excess water:

The following steps were adopted.

1. To prevent seepage of water from the adjoining highland drains were constructed close to the outer most bund as shown in diagram I. When it was difficult to construct such drains, drains were constructed around the bunds within the liyadda, to enable excess water to slowly flow out of the liyadda.

2. To improve drainage within the liadda parellel drains were constructed to have ridges 2 meters broad. This can be done very conveniently with the hand leveller at the time of final levelling. These drains help both drainage and also to enable to soil to dry up when even required. Such an efficient drainage system helps to reduce the amount of water soluble iron (ferrous iron) to the non soluble form (ferric iron).

3. Organic matter is known to increase solubility of iron. Therefore addition of organic matter to the soil during land preparation was reduced to a minimum.

4. Extra potassium was applied to the growing rice crop. In our experimental plots, extra potassium was applied before planting and then again at 4 and 8 weeks after planting rice. The total amount of potassium applied to the plots were 103 kg/ha.

5. Where irrigation water was readily available the soil was allowed to remain dry for about a month.

The rice varieties grown in the experimental plots were the most popular rice varieties grown in the district. They were : *BG 400-1, BG 379-2, BG 573, BG 94-1, and BG 34-8.*

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6. The drainage channels within the liyaddes had to be de-silted to enable them to remain effective through out the season. This was achieved by using a locally fabricated tool. (More information about this appears on Page 18).

De-silting had to be done monthly.

Observations:

1. Observations were made and recorded on

   - growth of rice plants.
   - tillering
   - colour of rice leaves and roots
   - drainage conditions during the season.

2. In the experimental plots growth of rice plants was good. Tillering was normal. Except for the nitrogen deficiency symptoms that occurred sometimes leaf colour was normal. Rice roots were lighter in colour (light brown).

   In the control plots, although rice plants appeared poor, tillering was observed. Leaf colour became yellowish brown. Varietal differences influenced the degree of leaf discolouration. Root growth and development was poor. Root colour was dark reddish brown.

3. Yields obtained:

Season	Rice variety.	Yield obtained kg/ha Experimental Plot.	Control Plot.	Increased Yield %
1985 Yala	BG 400-1	4150	2880	1270
	BG 379-2	3530	2370	1160
	BG 94-1	3370	2270	1100
	BG 34-8	3200	2350	850
85/86* Yala	BG 400-1	3350	2530	820
	BG 573	3520	2660	860
	BG 94-1	3200	2210	990

* Unfavourable weather conditions during the flowering stage of rice caused reduced yields in both experimental and control plots.

Conclusions:

The work reported in this Paper was done in farmers fields. These farmers are convinced about the good results obtained.

It is likely that drainage of excess water from the rice fields affecred by iron toxicity can increase rice yields. Perhaps th is may enable the farmers to increase their profits as a reward for reducing the iron toxicity damage to their rice crops.

Children and world development

The physical and mental development of children is intimately related to the social and economic development of nations. Today's children must not be made to bear the burden of difficult economic times. Broadly applicable and low-cost methods of enabling parents to improve child health are now available. With present knowledge, and with international support, it is therefore possible to achieve, in the next few years, one of the greatest goals which mankind has ever set for itself – basic protection for the lives and normal development of all its children.

A TOOL FOR DE-SILTING DRAINAGE CHANNELS WITHIN A LIYADDA

A.T. Edmund (Krishikarma Vyaptha Seva Niladari), Delwaguru - Gampaha District.

Introduction:

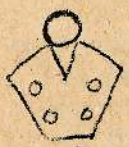
The tool described here is easy to make and excellent for desilting "Kivul ela" in liyaddes. This tool can be constructed by any local blacksmith using locally available materials.

Materials required -

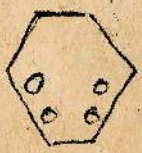
1. discarded mammoty blade - one
2. one inch long bolts (and nuts) - four
3. Piece of sheet (from a discarded barrel) - one
4. Mammoty handle - one

Method of Construction:

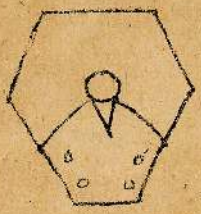
Mammoty blade as shown in diagram one.



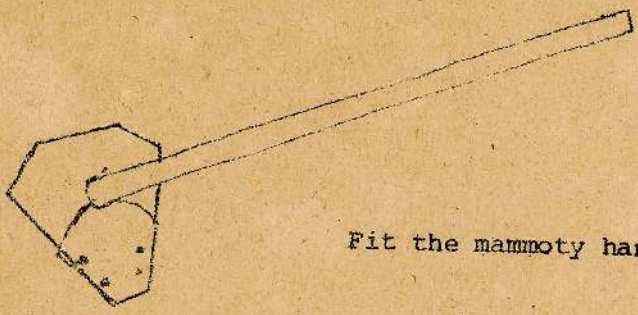
Make perforations on the mammoty blade as shown in diagram 2. The holes made should be just large enough to accomate the nuts to be fitted.



Cut the flattened sheet of barrel according to dimensions given in diagram 3. Then bore holes on the sheet identical to those made on the mammoty blade.



Fit the piece of barrel sheet to the mammoty blade firmly with bolts and nuts.



Fit the mammoty handle.

How to use:

Three (3) weeks after sowing or transplanting your rice crop drag the tool along the drainage channels (Kivul Kanu).

The channels get desilted very conveniently. If a lot of soil has been washed into the channel, you should apply more pressure while dragging to remove the accumilated soil from the channel.

Benefits achievable:

On a per acre basis a yield increase of 20-30 bushels can be expected if you have an adequate number of Kivul Kanu in the liyadda and desilt them using the tool described here.

The cost of construction of this tool will be less than Rs.50/- This is a worthy investment as the increased yield will exceed Rs.1500/- per acre.

SESBANIA - A POTENTIAL NITORGEN FIXING GREEN MANURE CROP.

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Sesbania is a legume. Useful as a green manure crop. Being an annual crop its life cycle is complete in 3 - 3½ months. Under good management sesbania plants grow upto a height of 250 cm. Flowering occurs at the age of 8-9 weeks, after germination and at this stage the crop can be be ploughed in as a green manure crop. Nitrogen fixing nodules are found both in roots and shoots and and shoot nodules start developing from the 3rd week after germination. There are 3-5 rows of shoot nodules on the stem and branches and the nitrogen fixing activity shifts from base to apex, with the age. Shoot nodules are found throughout the stem except for about 50-60 cm. from the apex. It can fix atmospheric nitrogen by both shoot and root nodules. Sesbania grows in submerged conditions although the growth rate is slower. Therefore it has a great potential in both highland and lowland sandy and/or degraded soils, to improve the soil structure and nutrient holding capacity.

Sesbania seeds obtained from IRRI Philippines, were grown at the Regional Research Station, Bombuwela, under highland conditions.

Sesbania is supposed to be photoperiod sensitive and therefore a study was undertaken tin April 1986, to find the best planting time for seed production, and as a green manure crop, by staggering planting every 10th day. At the maturity of the 1st planting (95 days) noduler actaivity was investigated and is presented in Table 1.

Data indicate that the noduler activity was 98.5% at the onset of flowering and at this stage the plants could be ploughed in as a green manure crop. If the crop is ploughed in at this stage, it adds nitorgen to the soil nitrogen buffer in addition to organic matter. The Data also indicate that the nodule activity shifts from base to apex with age and also the nitorgen fixing activity decreases. Shoot nodule dry weight per plant also indicate that it increase with the age while the activity of nodules decreases. Whether this decrease is dry weight could be

compensated by having a higher dry weight can only be judged based on the fixed nitogen analysis. However if allowed to grow beyond flowering stage, the value of the crop as a green manure is lost except for the advantage of seed production.

Potential of the crop

Sesbania could be used as a green manure crop, to upgrade the soil structure of the sandy and /or degraded soils. Because of its ability to thrive under wet soil conditions it has an immense potential in both highland and lowland soils. As a green manure it could be grown during the fallow period and ploughed in at land preparation. This could increase the organic matter content and the nitrogen buffer in both highland and lowland soils. Unlike non-legume manures, if sesbania is used as a green manure crop, the basal organic nitorgen application could probably be ignored. Another alternative is to grow the plants on bunds. At flowering stage it could be harvested and put to the paddy fields at the time of nitrogen top dressing, provided the crop is row planted or row sown. This practice is advantageous because the mulch smothers the weeds. However, further research is needed to understand the photo-periodic behaviour of the crop, its nitrogen fixing ability, and any adverse effects of applying the green manure as a nitrogen supplement at later stages of the rice crop.

CONSERVATION FARMING

Part III.- Multi-species, Multi-storey Cropping, (Or Homegarden Agro-forestry)

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Introduction

A 'Homegarden' is a piece of land around a dwelling with clear boundaries and it has a functional relationship with its occupants related to economic, biophysical and social aspects. A homegarden often consists of a mixture of annual and perennial crops, sometimes including small livestock. On account of its vertical structure with different canopy depths of various plant species, the homegarden is more ofen referred to as a 'multi-species, multi-storied cropping system. The structure and management of a homegarden could vary from place to place depending upon ecological, socio-economic and cultural factors.

The development and maintenance of homegarden is a collective effort of the family members. The cultivation of varied species of plants around the is usually unplanned. One of the main reasons for growing trees around the house is to provide shade and create a favourable microclimate for the household especially during hot weather.

The homegardener selects the location where a crop is to be planted based on the characteristics of the plant and its value. Vegetables are usually planted in open areas or for convenience at the back and sides of the yard close to the house. Kiriala and Kohila with a high water requirement are planted close to the well. Tall trees are often planted along the boundary of the property, while food/fruit crop trees are planted within the boundary. Trees grown in the homegarden could be grouped into several categories based on their functional value. These categories are (1) ornamental, (2) vegetable, (3) medicinal (4) spices, (5) fruits, (6) starch food crops, (7) fodder, (8) timber (9) firewood, and shade.

The most intensive homegarden systems are found in Kandy and Matale districts (Mc Cannel and

Dharmapala, 1973, Kendaragama, 1983). These are small units based on a close association of coconut, kitul and betel palm under planted with cloves, cinnamon, nutmeg, citrus, mango, durian, jakfruit, rambuttan breadfruit, bananas, pepper vines and a peripheral ground storey of maize, cassava and beans.

Dry Zone Homegarden

The traditional homegarden in the dry zone is situated below the water tank. The hgh soil water table makes it possible to grow perennial crops such as coconut, jakfruit, plantains, papaw and breadfruit. Today most homesteads are lease lands, situated along the roads on high ground and, the homegarden is confined to a small area of about 0.05-0.1 ha around the dwelling while rest of the homestead is ground with a range of seasonal arable crops for home consumption and sale.

The dry zone homegarden contains a mixture of food/fruit trees such as coconut, mango, banana (or plantains), sour sop, jak fruit, cashew, woodapple, papaw, guava, lime, orange (mostly Kudalu) promogranate (deulum), drumsticks and tamarind. There are isolated instances of annual crops such as cassava, sweet potato, Kiriala and winged bean being cultivated . Farmers deliberately retain or sometimes grow some other species of trees or shrubs in their homegardens. Among these are margosa, halmilla, mee, teak and satin-wood. (Weerakoon, 1986).

Arrangement of Components:

The spatial arrangement of plant components in a homegarden are irregular and appears to be very haphazard with the trees/shrubs and food crops being intimately mixed. Vertically, several relatively distinct zones can be distinguished. In terms of canopy depth, the lowest zone (0-1.0 m) consists of food crops such as kiriala, spinach, sweet potato, ginger, kaha and wadakaha. The next zone (1.0-2.0 m) canopies mainly consist of promogranate, lime, sugar cane, castor, cassava etc. Still higher the banana canopy (2.0-5.0 m) and fruit trees such as banana (especially seeni kesel), sour sop, laulu, nelli, papaw, guawa, and some instances drumsticks and katurumurunga. Above this layer, vertical zonation is less distinct

with a diffuse zone (5.0 - 20.0 m) of fruit trees (jak fruit, woodapple, cashew etc) and timber trees. There is a considerable overlap of the storeys with continuous recruitment to the various zones.

Chicken are usually free to roam and scratch the surface soil of the homegarden, while goats are stabled. Bee keeping is an another feature sometimes observed.

Evaluation (merits, weaknesses/constraints):

The advantages attributed to a homegarden are many. The mix of trees with multi-storey canopies effectively protects soil against erosion due to rainfall and wind (Weerakoon et al, 1985) It prevents excessive water evaporation from the soil surface. A large amount of biomass returns to the soil as organic matter in the form of fallen leaves, flowers and branches, aiding enrichment of soil fertility (if allowed to decay in situ) and soil infiltration of water.

The tree roots capture nutrients moving through the soil profile. There is little weed proliferation due to shade offered by the tree canopies. The diversity of plant species in a homegarden can provide nutritional constituents such as vitamins, minerals, carbohydrates, fats and proteins. The harvesting and consequent income generation is dispersed throughout the year and thus provides greater stability than is possible with one or two annual crops. The farmers also obtain a good part of their firewood poles, timber, fodder and medicinal products within the confines of their homegardens.

More often social and biological problems/ constraints could limit the improvement of the homegarden of the dry zone. Seven such constraints have been identified (Weerakoon, 1986), and these in order of their relative importance are as follows: drought soil infertility, non-availability of planting materials, lack of technical know-how, wild animal crop damage, domestic animal crop damage and theft of animals such as chicken, goat and cattle. On average each farmer faces at least three of these problems. They feel they have little or no control over animal damage and thefts.

Potentials:

It is very important to organize an efficient extension service to make homegarden systems more productive and economical. The following measures could be used to overcome the biological problems/ constraints to improve the overall productivity of homegarden systems.

a) Adoption of better soil management techniques, such as mulching and mechanical soil conservation thereby mitigating moisture stress especially during dry periods and minimizing soil erosion.

b) Replacement of less productive tree/shrubs with fast growing nitrogen fixing tree species eg. Leucasne leucocephala, Gliricidia sepium and Sesbania grandiflore to provide green manure for soil enrichment and also obtain firewood and fodder.

c) Formulation of appropriate fertilizer recommendations for the multi-species association and popularisation of composting and compost use.

d) Dissemination of further information regarding the value of integrating botanicals with anti-pest properties such as margoss, karanda and wel habaala, which are already being used by some dry zone farmers. For a small scale farmer chemical pest control is scaresly an alternative.

e) Improved apiculture eg. use of improved bee boxes, improved harvesting etc.

The homegarden system in the dry zone is operating far below its potential efficiency. Since it is a permanent rather than a temporary form of land use, it clearly takes precedence over chena. In the past there was little competition for land, but as population increases and the land becomes scarcer, the demand for more efficient land utilization is likely to increase.

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Hawaii stocked dairy cows on leucaena/guinea grass pasture (1:1 ratio) at 6 animals per ha, and each year obtained over 9,700 liters (21,400 lb) of milk and 400 kg (800 lb) of live-weight gain per ha.§

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