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PERADENIYA.

Whenever you can shorten a sentence, do.

And one always can.

The best sentence?

The shortest.

- Gustave Flanbert.

C O N T E N T S

CONSERVATION FARMING.

Part - IV.

A Model of Sustainable Agriculture.

W.L. Weerakoon, Research Officer.
A.R.S., Maha Illuppallama.

Farming Systems in Dry Zone

The farming systems in the dry zone of Sri Lanka typically consists of two main components. They are (1) rainfed upland and (2) irrigable lowland. On the lowland 'wel-yaya' mainly rice is grown. In addition to the paddy crop in the Maha season (Oct-Jan.), (depending on the water supply) a short-aged rice variety is planted in the Yala season (April-July). This is followed by a fallow period during which cattle and buffaloes graze in the paddy fields (Abeyratne, 1956, 1962).

The rainfed upland comprises of two main components. (1) the village area or 'gangoda' which represents the family homestead, and (2) the area where shifting cultivation is practised.

The cropping around dwelling is normally known as a 'Home garden' or a 'multi-species, multi-storey cropping system' which can be considered as a developing farming system within the homestead component - (Weerakoon, 1986a). This includes cultivating perennial plants such as fruit trees, food crop trees, timber trees and fuel-wood trees (Weerakoon, 1986b). Sometimes vegetables are also grown for home consumption. The rest of the homestead may be categorised as a 'permanent arable cropping system' where a range of seasonal crops are grown for home consumption as well as for marketing. A major area of the village consists of farm units, where shifting cultivation is practised. The range of crops grown under shifting cultivation is rather wide, and include cereals, coarse grains, pulses, root and tuber crops as well as agro-industrial crops.

Fig.1. The farming systems in the dry zone.

A. Lowland — Permanent, perennial cropping systems (Homegarden)

B. Upland
1. Homestead — Permanent arable cropping system.
2. Shifting cultivation.

Under shifting cultivation long fallow periods ensure rejuvenated soil fertility, because of the 'biomass' it produces, restoration of good soil structure, and control of weeds. In addition it provides the other essentials usually harvested from bush fallow, mainly stakes, firewood and fodder.

As a result of increasing population and pressure on the use of land, the cropping period has to increase while fallow period has to decrease. This shortening of the natural fallow in upland farming results in the declining productivity of the small hold farming systems. This is partly because of declining productivity of the small hold farming systems. This is partly because of decling fertility as a result of reduced biomass production and also partly due to increased weed infestation, especially perennials (of C_4 types).

Therefore any new system to be developed must meet several major criteria in ordear to be an improvement over the existing system. The new system must :

-- provide a means of controlling erosion,

-- provide a means of maintaining fertility through biomass production,

-- provide a means of controlling weeds and other pests,

-- provide firewood for the farmer and fodder for cattle.

-- utilize little or no high cost inputs,

-- be acceptable to the farmers and compatible with the farming systems.

Model of sustainable farming system.

Modern agricultural production methods have evolved along the lines which are in conflict with the inherent laws of ecology. Usually in an ecological system the flow of material is cyclic (nutrient and biomass cycles) and the components are complex and diverse. Such an ecosystem is stable and autonomous. The individual factors of a 'farm' ecosystem are interlinked and multifunctional. However modern agriculture based on industrial principles dspends on the greater use of 'inputs' from outside (ie. linear) such as fertilizer, pesticides, machinary and energy, and also concentrate more on monoculture. By disregarding the laws of ecology increase in production is achievable but at the expense of the stability and the self-regulating mechanism (or autonomy) of the system.

From the ecological point of view to develop a stable and sustainable farming system it is vital to return from linear to the cyclic production systems, for example with farm's own resources such as green manuring, cattle manure etc. These limit inputs from outside to a minimum.

By definition conservation farming is a broad system of land and water use aimed at achieving sustained agricultural production while minimizing the the depletion of natural resources (soil,soil fertility. soil moisture) and minimising the use of high cost inputs (energy, machinary, fertilizer, pesticides etc.). Depending on the situation in each locality, conservation farming may include several components to reach a self sustaining agriculture. They are :-

- combination of agriculture with forestry through mixed or avenue cropping,
- multicropping of annuals,
- green manuring
- biological nitrogen fixation,
- use of live or residue mulching,
- integration of botanicals with anti-pest properties,

- integrated pest management,

- integration of crops with livestock,

- Supplementary use of Mineral fertilizer.

- use of improved low-cost energy conserving tools.

These measures although not complete, identifies the key factors to achieve sustainability. They contribute to high biomass production and resultant high soil organic matter content. These in combination with other soil conservation measures such as mulching bunds and contour drains are highly relevant to the development of sustainable farming model. This should suit the different categories of Land in a catenary sequence in the dry zone. The main components of this model (Fig.2) comprises :

- multi-storey home garden with soil improving nitrogen fixing trees such as Leucaena leucocaphala, Gliricidia sepium and Sesbania grandiflora (middle storey of the system and along the property boundary) (Weerakoon, 1986c, Weerakoon 1986b).

- erosion control barriers of hedge-rows of L. leucocephala and G sepium at 4.0m intervals on the contour, regularly pruned for avenue planting of arable crops, contour bunds at wider intervals (30m) on slopes. (Weerakoon, 1986a).

- planting of grass in avenues of buffer strips to minimise erosion and provide fodder for cattle. Fruit/food trees to be planted along the buffer strip at a wide spacing if necessary.

- line or double hedgerow planting of L. leucocephala or G. sepium on rice bunds for fertility maintenance in the lowland (Weerakoon & Gunasekera, 1985)

- plant mixtures for green manure purposes with fast and high biomass production. This includes legumes such as Sesbania sesban (Weerakoon etal, 1985) for lowland paddy and ground covers for uplands.

- intercropping legumes with cereal crops instead of monocropping.

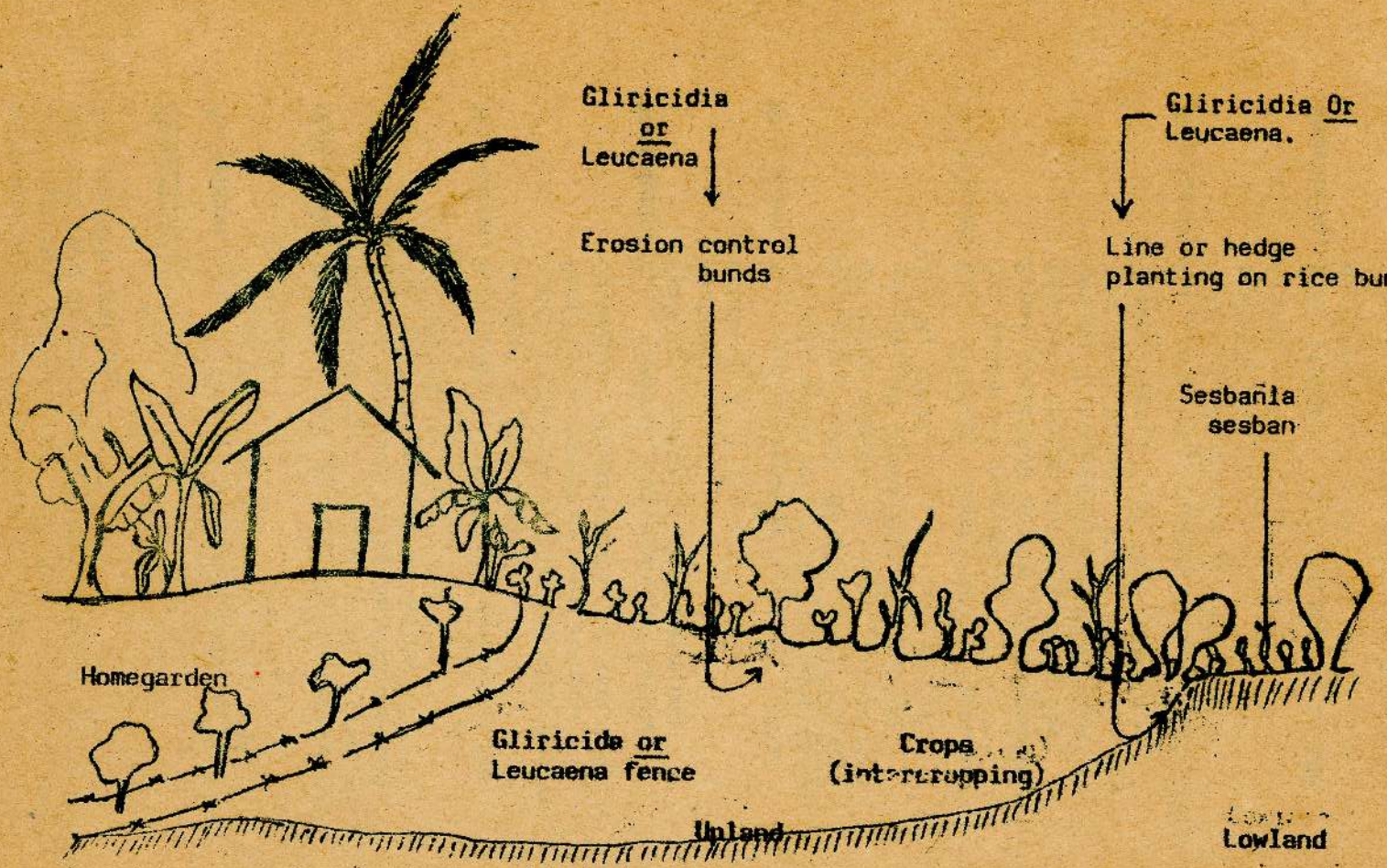

Fig. Generalized toposequence land use plan for conservation farming with multi-purpose tree legumes.

In addition to fertility restoration through biomass production and soil conservation, by-production and soil conservation, by-products such as firewood and fodder provided by leguminous plants are important features of this model. Such a model may (in view of our experimental results) be utilized for on-farm testing.

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STORAGE OF ONION SEEDS.

(S. Gamini de Silva)

Introduction

Onion is known for the bad storage potential of its seeds. The Seeds Division, Department of Agriculture, requested some data on the germination after storage of the red onion variety Vedalai in its main production areas.

Materials and methods

Seed was packed in 300 g polythene packs and in sealed tins, stored in Batticaloa and Trincomalee in February, 1983. Initial germination was 82% at 6.45% moisture. Each following month a sample of the polythene packed seed was sent to the Peradeniya seed lab for analysis. At the storage capacity in sealed tins was expected to be better these samples were to be sent every 6 months only.

Results

Two main problems caused an early discontinuation of the trial. The ethnic problems made sampling impossible in Batticaloa after 4 months, rats damaged the seed in Trincomalee in t he 7th month.

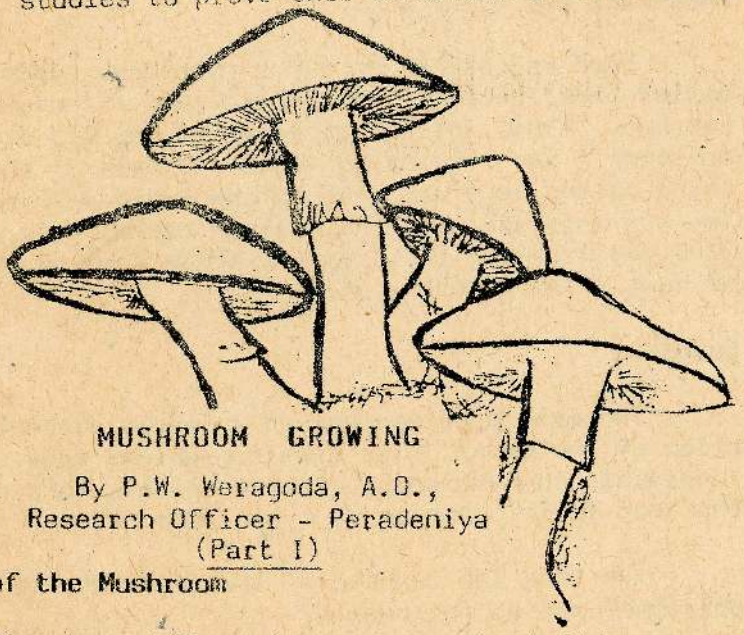
The seed lab results of the seeds stored in polythene are as follows:-

Storage	Trincomalee		Batticaloa	
(Months)	Germination. (%)	Moisture (%)	Germination. (%)	Moisture (%)
1	90	-	82	8.3
2	82	8.3	88	8.5
3	77	-	85	-
4	79	8.9	81	9.2
5	74	9.9		
6	67	8.7		
7	51	12.1		

Only one tin was analysed, stored in Trincomalee for 6 months. Germination was still 82%, moisture 6.5

Discussion

Because of the problems mentioned this trial could not be finalised. The table shows however a clear drop in germination after 5 months storage in polythene, which is not shown in the sealed tin. The polythene appears to be an insufficient barrier to the moisture. The limited trial shows an advantage of sealed tins for onion seed storage. However, further studies to prove this statement is required.



MUSHROOM GROWING

By P.W. Weragoda, A.O.,
Research Officer - Peradeniya

(Part I)

History of the Mushroom

Although most fungi have a very short life span, they have existed for millions of years. Imprints of mushroom lamellae have been found on wood dating back before the origin of man.

During the period of the Roman Empire the sale of mushrooms was regulated by law. In the ancient times mushrooms were considered creations of the devil; some people believed that merely touching them was harmful. Mushrooms growing in clearings in the woods and fields were believed to be gathering places where witches danced on moonlit nights.

Today there are more than 10,000 varieties of fleshy mushrooms about 50 of which are edible.

Continued on page 23.

AUDIO-VISUAL AIDS

Why Bother about them?

Jonathan F. Cook
C.T.O., The British Council.

Why are you reading this article?

Do you read everything in Krushi ...Do you have a particular interest in this subject ... or was your attention caught by the drawings as you flicked through the magazine ?

Studies have shown that in general, people are more attracted to pictures than words. This is why Audio-visual (AV) aids are important. They attract attention and add interest to a subject.

People remember more of what they see than what they read. Very little appears to be remembered of spoken messages alone unless they are repeated over and over again. However, if they are accompanied by visual images, the amount of information retained is very much higher. Sight and sound are the most important senses for learning but in general the more senses involved, the better the retention of information.

Estimates vary but the proportions of learning below (from a study by Kodak), give an idea of how much each sense contributes to what we learn.

Sight and sound together may contribute up to 95% of what we learn.

Audio-visual aids rely on this fact.

So what is an Audio-Visual aid ? It means anything which uses both sight and sound to help the trainer/teacher do his/her job better. An AV aid can be anything from a chalkboard or a flipchart (where the presenter's voice is the 'audio' part) up to sophisticated electric media such as film and video.

Audio-Visual equipment is not the same thing at all. All training centres, schools and institutes have equipment. Some good, some poor, some broken and much of it unused.

Merely having the equipment does not mean that it will be used or used effectively. Sometimes repairs are needed, sometimes accessories or materials need to be bought, but the main problem is simply making the time to prepare materials. Making AV materials does take time so it is easy to simply not bother. However if an instructor takes his/her job seriously and wants to Put messages across in a way that will be remembered, use of AV aids is very important.

When should AV aids be used ?

There are five main situations when you need to use an AV aid.

1. When the message is too complicated for words alone.

For example if you want to explain the growth stages of a rice plant, or the best way to plan a home garden, words alone will not be adequate.

2. Words make different people think of different pictures.

When you are talking about something, you want your audience to all be thinking of the same image.

3. You want people to remember much of what you say.

If you want people to be able to talk about' or ' do something about' the point, an AV aid can increase retention up to 95%.

4. You need to attract or regain attention.

How long is your talk? How interested is your audience ? Have they fallen asleep? AV aids always liven up a talk and make it more interesting because of their entertainment value.

5. You need to summarise important points.

An AV aid can help a lot to summarise the main points of your talk by emphasising and repeating the points.

Often the best teaching aid is the real object. Other aids such as models, printed visuals, projected aids should be used when the real object cannot be used for some reason.

Is the object of your talk too far away, too big or small, too expensive, not ready yet, or not practical to show?

An insect life cycle , soil types in Sri Lanka the path of the Mahaweli river, the digestive system of a cow ... these are all examples of where AV aids are needed to help explanation.

Whatis a GOOD Audio-Visual aid ?

Everyone has seen examples of bad AV aids - dirty Overhead transparencies with too much information on them so that they don't fit on the projector flipcharts with no pictures, handouts badly duplicated so that they are unreadable, Sets of slides which go off the point or are too dark to be seen properly ....

GOOD AV aids, help make messages clearer and easier to understand. If they only attract attention to themselves, they take away from the presentation. The following points describe a GOOD AV aid.

(1) Visible - The audience (all of it-even the person sitting at the back) MUST **be able** to see it. Try standing where your furthest viewer will be and see how well you can see your aids.

(ii) Audible - Audio aids must be heard and understood by the audience.

(iii) Accurate - Keep diagrams and drawings to scale. Don't exaggerate, Make sure the information is factually correct.

(iv) Appropriate - Don't show AV aids just because you have them. They must fit what you are talking about.

(v) Clear - All aids should be neat and clean. Use simple lines and clear colours. Do not overuse colour - it can confuse rather than aid if it is used without purpose.

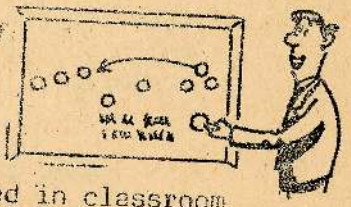
(vi) Efficient - Prepare AV aids and equipment in advance. Don't show them until needed. Test the equipment before you use it.

What aids should you use ?

Obviously, not all AV aids are equally appropriate. Projected aids such as slides and film are not usually practical in a field situation, but simple printed visuals such as flash cards or flipcharts can be very useful.

Sometimes movement needs to be shown such as how a sprayer works. In this case, a working model, or a film of such a model in action might be the best aid, Cost, equipment and power requirements will also affect the choice of aid.

Advantages and disadvantages of better known AV aids are given below:



1. **Chalkboard:**

The oldest visual aid. Overused in classroom and badly underused in field extension work. Portable 'roll-up' chalkboards can be made, and training courses in how to make and use them are conducted at the Audio-Visual Centre, Gannoruwa-Peradeniya for the Deepartment of Agriculture.

Advantages: Effective for building up step by step presentations where your audience only sees what you present rather than the whole diagram at once Diagrams can be prepared beforehand, especially when 'roll-up' chalkboards are used.

Disadvantages: Takes time, if not prepared beforehand, you need to be able to speak and write at the same time. Some artistic skill needed. Has a tendency to be overused especially ion the classroom.

2. **Flannelboard:**

A large cloth background on which parts of an illustration are built up step by step. Flannel or blanket materia is commonly used for the background and the illustrations have small pieces of sandpaper stuck to the backs. This allows them to 'stick' to the flannelboard.

Advantages: Materials are prepared beforehand. Good for building up step by step descriptions. Cheap to prepare.

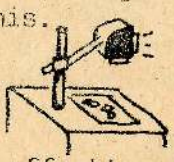
Disadvantages: Takes considerable time to prepare. Not much use for field work as the illustrations do not stick well enough in windy conditions. 'Velcro' hook tape can be used to overcome this problem.

3. **Flipchart:** A set of large drawings, usually hand made, but can be mass produced. Each sketch illustrates one point.

Advantages: Portable, reuseable, ussually tailor made to suit a particular audience and subject. Cheap.

Disadvantages: Tend to be badly made when only words are used. Needs some artistic skill, though cut out pictures from magazines, or traced drawings can overcome this.

4. **Overhead Projector.**

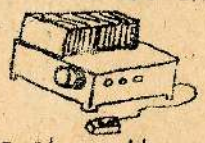


Advantages: Very effective visual aid for small audiences. Room doesn't need darkening, Eye contact maintained with audience, versatile aid, when overlays and other methods are used.

Disadvantages: Needs electricity. Frequently badly used with presenter talking to screen instead of audience. Practice and some minimal skill needed to prepare good transparencies, though this is easily learnt.

The AV Centre conducts courses on use of the Overhead Projector.

5. **Slides & Tape/slide.**



Advantages: Combines strength and impact of photographic images on a large screen with sound. Shows realistic situation. Easily altered and updated. Pace of learning can be controlled. Feedback possible. Not very expensive.

Disadvantages: Needs electricity, projection and sound equipment. Takes considerable time to prepare and good presentation. Needs dark room.

6. Film:

Advantages: Very effective if appropriate film available. Shows real situatic with sound vision and movement. Large clear screen.

Disadvantages: Availability of good films very limited. Projection equipment expensive and difficult to maintain. Dark room - loss of contact with audience. Cannot control pace-poor learner participation. The main disadvantage is simply the lack of good films in Sri Lanka.

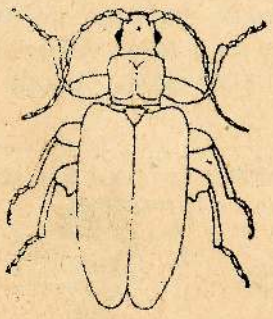
7. Video:

Advantages: Simple to operate. More versatile than film. Possible to alter but still difficult. Cheaper to produce than film. Instant playback - especially good for role play sessions.

Disadvantages: screen much smaller than film (TV). Does not have the same shapeness as film. Equipment and spares are expensive.

8. Real thing or model

Advantages: Often the best aid of all. Involves all 5 senses. No difficulty in recognition of the object.



Disadvantages: May be difficult to arrange. Not always possible for all to see. Sometimes AV aids better to simplify and explain before returning to real thing/situation.

One final point on the use of AV aids.

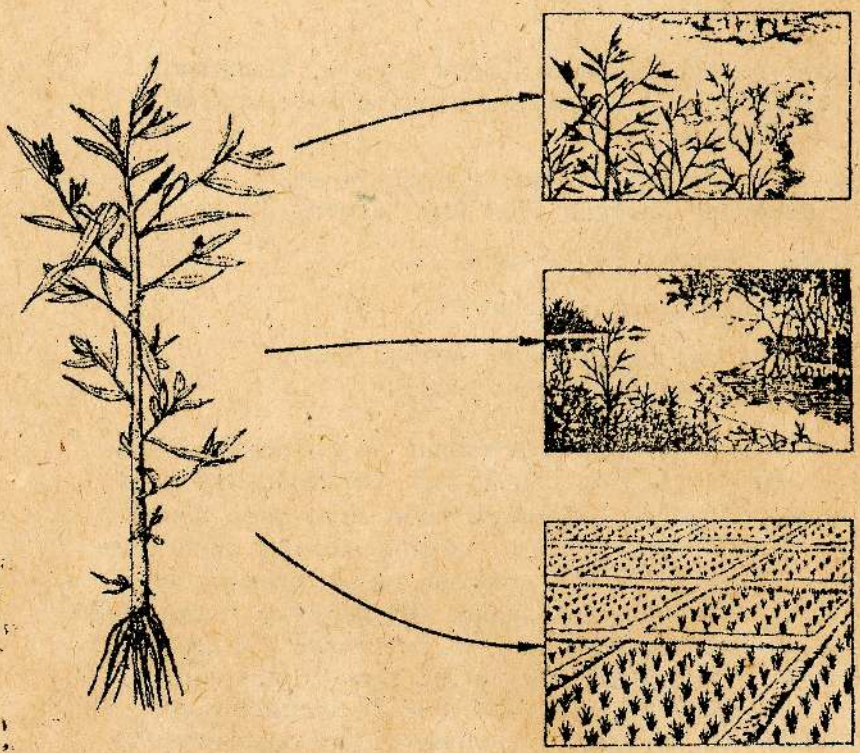
- **With the exception of aids such as film**, video and synchronised tape/slide programmes, the presenter is as important or more so than the AV aid.

- A good speaker without AV aids **can** be more effective than a bad speaker **with** AV aids.

- Most presentations however will be improved by the use of a few well chosen AV aids to liven up the talk and emphasise and clarify points.

- "Practice makes perfect" - Try producing a few simple aids and see how much interest they create.

- Further information and advice is available from the Audio-Visual Unit, Department of Agriculture, Gannoruwa, Peradeniya.



Proposals for achieving self-sufficiency in Onions.

P.H.D. Fernando and V.S. Ginigaddara,
District Agricultural Office - Puttalam.

Onion is an important spice. While being nutritinal it also possesses medicinal properties, specific for certain ailments.

Although per capita consumption requirement of onion is estimated at 14.93 lbs. (per year per individual), (M.R.I. Report 1984) real per capita consumption is about 6.36 lbs per year. This low level of consumption may be attributed to non availability or short supply of onions. However, since even this quantity has not been produced locally, a fair percentage of onions is imported. Department of Agriculture has from time to time engaged its attention to expand the area under this crop but there were obstacles to achieve this goal. Our experience it is that a programme to increase onion production should receive concerted and combined eforts of several Government Agencies, at the national level.

Responsibilities of these Government Agencies may be as follows:-

1. Dept. of Agriculture. (Seed supply, Planning, Implementation and monitoring and program evaluation)
2. Dept. of Marketing and Co-operatives, (purchase produce from the farmers.)
3. Banks, (Credit facilities).
4. Insurance. (Crop insurance).
5. Agricultural Development Authority. (Co-ordination, input supply).

Suitable areas for successful onion cultivation have been identified and production technologies have almost been perfected. Studies have also been done regarding production trends in onion growing districts. At present Puttalam is the largest onion growing district and it produces only about 10% of total consumption requirement but this can be increased to almost 100% phased over a short period of time. However our target should be to produce the entire quantity of onions needed to satisfy the consumption requirement of the Nation, which is in the region of 8500 tons per month.

However in planning a production programme it is advisable and realistic to base it on the nutritional requirement. Calculating on this index the requirement as stated earlier is certainly attainable in the context of present acre yield of onions obtained in the Regosol region.

Production capabilities of other districts too should be taken into consideration as this commodity could be produced during certain months of the year and this could well augument any production short fall in major onion growing district. Apart from the above consideserations the acre yield of onions varies significantly, depending on environmental factors and weather conditions prevailing during the growing season. Therefore the time of planting and harvesting is critical in the production programme. Hence the entire production programme needs careful planning and monitoring.

Based on the foregoing information following proposals are made.

1. Organise and discipline the farmers in traditional onion growing areas for timely planting. This is being done in Puttalam district.
2. Fix an attractive floor price for onions. (Rs.10/- to Rs.12/- per kg.farm gate price)
3. Total stoppage of import of onions by end of 1987 or even earlier.
4. Achieve self-sufficiency in seed material through production of true seed. (50% of farmers seed requirement is now produced in Puttalam district.
5. Provide a soft loan scheme to prospective onion growers under different farming systems and conditions.
6. Undertake detailed research into all aspects of onion cultivation as new problems could be encountered in large scale production.
7. Intensify studies pertaining to ture seed productin of Big onion.
8. Stop new planting of Coconuts in the Regosol region region as this will eventually reduce the land available cultivation of onions.

PAPER BAGS FOR SEED PADDY STORAGE

(S. Gamini de Silva)

Introduction

The Department of Agriculture of Sri Lanka has been using jute bags for seed paddy storage for a long time. The procedure is that the Department of Agriculture supplies the required number of gunnies to its contract farmers. After the harvest the gunnies come back to the Department or the farmers will have to pay for them. As one gunny costs about Rs.25/-this procedure requires a high investment input by the Department of Agriculture and a big administrative effort. There is a tendency that the farmers require smaller quantities of seed paddy than the presently used 2 bushel bags.

Because of these two reasons an alternative for the gunnies is being looked for. In this report the suitability of 1 bu. paper bags for seed paddy storage is reviewed.

Materials & Methods

A preliminary trial with paper bags was necessary too check the strength. It appeared that 3 ply paper had the tendency to burst when a paddy filled bag was dropped from a stack. Therefore, only 5 ply paper bags were used in this trial.

Certified seed paddy of the variety Bg 400/1 (4-4½ months), produced in the 84/85 maha season was used in this study.

The seed was machine processed. Half of the lot was sundried upto a sufficiently low moisture level (11.6%). The other half was used without extra drying (12.9% moisture).

Both lots were packed in paper bags and gunnies Before packing, the initial moisture content, germination percentage, insect damage and purity was assessed. For the low moisture lot the germination was 99%, insect damage 66 seeds per 500 g: for the high moisture lot this was 98% and 63 seeds respectively.

The bags were labelled,sealed and transported to Gannoruwa Farm. They were stacked according to a randomised block design with four replicates.

Samples were drawn from each bag every month by using a seed trier :-

- One sample of approx. 750 g. in a cloth bag.
- One sample of approx. 40 g. in an air tight container.

The samples were immediately brought to the seed laboratory and tested for germination, moisture content and insect damage according to the I S T A methods.

Results and Discussion

The readings on germination, moisture and insect damage during the trial period is given in the table and figures 1 - 4. It can be seen that after one month the moisture content of both the lots with a higher and a lower initial moisuture are around 13%. It can be assumed that from that moment onwards the moisture content is in equilibrium with the RH of the surrounding air.

In all treatments the germination remains high during storage. In each case germination drops below the standard after 11 months. After statistical analysis (ANOVA) no significant differences in germination between the treatments were shown. There is an indication that in paper bags the insect damage is somewhat less than in gunnies. The average of the last 4 readings is 86 seeds in paper, 99 in gunnies.

Additional observations

Advantages of the Paper bags	:	Smaller quantity, easy to handle the bags are well closed; one is 100% sure that no inert matter is mixed after sealing. Easy printing of for instance Company logo.
Disadvantages of paperbags	:	Cost: Rs.30/- per 2 bu.difficult to sample the bags have to be closed with a sticker after sampling.

Concluson

Seed paddy, packed in paper bags retains its quality as long as seed packed in gunnies during this 12 months trial. Other factors, will be decisive for the choice of packing material for seed paddy.

TABLE I. **Laboratory observations on the seed lots.**

MC = Moisture content, G = Germination,
ID = Insect damage.

Time (Months)	Paper bags High Moisture			Paper bags Low Moisture			Gunnies High Moisture			Gunnies Low Moisture		
	M.C %	G%	I.D	M.C.%	G%	I.D	M.C.%	G%	I.D.	M.C.%	G%	I.D.
1	13.3	97	50	12.7	98	21	12.9	96	70	13.1	96	24
2	13.1	98	75	13.0	97	76	12.9	97	96	12.4	98	87
3	12.5	99	38	12.4	98	66	12.5	98	70	12.4	97	96
4	12.8	97	77	13.0	98	78	12.8	98	58	12.8	96	99
5	13.2	96	45	13.1	96	22	13.3	95	35	13.1	96	56
6	12.9	95	69	12.8	96	88	13.0	95	123	12.7	95	134
7	12.8	95	81	12.7	93	68	12.1	94	73	12.5	92	99
8	12.6	94	78	12.2	93	69	11.8	95	83	11.1	94	89
9	12.2	94	87	12.3	96	74	12.0	94	91	12.1	93	140
10	11.3	94	75	11.8	91	75	11.8	92	89	11.1	91	109
11	12.8	90	110	12.7	88	95	12.6	91	94	12.3	90	87
12	12.0	81	95	11.9	76	75	11.8	83	114	11.8	76	69

TIME OF PLANTING STUDIES OF INNALA,

GENEUS: Coleus, FAMILY : Labiatae.

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Introduction:

Innala is cultivated for the small dark brown, aromatic tubers, used as a substitute for potatoes (Solanum tuberosum). Innala plant is small herbaceous cultivated as an annual crop. It has succulent stems and aromatic leaves, propagation is by suckers obtained from sprouted tubers and tubers can be harvested 6 months after plantoing. It is usually planted under coconut as an intercrop. The average yield is 5-9 m.t/ha. under coconut.

Time of planting Innala is extremely important mainly because the yields depend on the appropriatness of the time of planting. Although casual observations on time of planting - yield relationship were discussed at various occasions, no proper experimental data had been confirmed. Therefore this experiment was done in 1984 Yala at the Regional Agricultural Research Centre, Makandura to study the effect of time of planting on tuber production and the yield of the innala crop.

Materials and Method:

Two local cultivars and one introduced cultivar were used as test crops in this experiment:

1. Cuttings were planted on raised beds (18 cm high) at a spacing of 25 cm x 25 cm.
2. One cutting per hill was planted.
3. The crop was given a basal fertilizer application of 10:25:40 lbs/Ac of N. P_2O_5, K_2O.
4. Basal fertilizer was supplemented with
   (a) one month after making ION lbs/Ac,
   (b) 2 months after planting 10 lbs N and 20 lbs K_2O/Ac,
   (c) 3 months after planting 10 lbs per acre of N.

TABLE I. Tuber yield as affected by time of planting Innala at Makandura. Mean tuber weight per plot in kg.

Cultivar	T_5 May 1984 D/H 8.1.85	T_6 June 1984 D/H 14.1.85	T_7 July 1984 D/H 14.1.85	T_8 Aug. 1984 D/H 12.2.85	T_9 Sept. 1984 D/H 13.2.85	T_{10} Oct. 1984 D/H 1.3.85
Kandetiya (Local)	1.886	2.668	2.098	2.389	1.572	0.625
K.D.Sel.4 (Local)	1.775	2.771	2.368	2.182	2.116	0.861
Indonesia (Introduced)	1.228	2.248	2.643	2.179	1.691	0.936
Total tuber weight.	4.889	7.687	7.919	6.750	5.379	2.422

TABLE I. Tuber yield as affected by time of planting Innala at Makandura. Mean tuber weight per plot in kg.

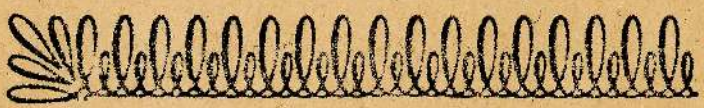
Cultivar	T_{11} Nov. 1984 D/H 1.3.85	T_{12} Dec. 1984 D/H 28.4.85	T_1 Jan. 1985 D/H 18.6.85	T_2 Feb. 1985 D/H 2.7.85	T_3 Mar. 1985 D/H 10.8.85	T_4 April 1985 D/H 20.9.85
Kandetiya (Local)	00	00	00	00	00	00
K.D.Sel.4 (Local)	00	00	00	00	00	00
Indonesia (Introduced)	00	00	00	00	00	00
Total tuber weight.	00	00	00	00	00	00

Observations and Results:

These crops were harvested at maturity (detected by the senesence of bulk of the conopy). Results show that November to April planting did not produce any tubers. Tuber initiation was seen for the first time on cuttings planted during the month of May. The production of tubers that initiated with planting in May showed increased tuber formation with June and July plantings. The August planting which was observed to give a yield which is higher than the May planting, however, it was lesser than June and July plantings. Yields with the September planting were lower than the June, July and August planted crops respectively. Yields rapidly declined with October planting. The two local cultivars Kandetiya, K.D.Sel 4 and the introduced Indonesian cultivar whowed similar treds. This same experiment was repeated at Walpita during 1985, and it gave similar results.

Conclusions:

Although the data obtained from cultivating the above high yielding cultivars are limited to one season, it can be confidently stated that under Makandura and Walpita Agroclimatic conditions, June, July and August planting will give optimum yields. The yields obtained at Makandura on different dates of planting are shown in the table 1.



Commercial Mushrooms Culture

Mushrooms play an important role in maintaining the cycle of nature, they decompose and clear away left-over pieces of wood and leaves, materials not easily degradable. Mushroom growing offers definite possibilities of profitable returns, but large scale ventures should be undertaken only by growers who have had experience with smaller crops. Successful mushroom culture require constant and careful attention throughout the whole period of preparetory work work and subsequent development of the crop. Proper precautions must be taken to guard the development of pests like ants, rats, snails etc.

Continued on page 36.

SOME PHYSICAL PROPERTIES OF REDDISH BROWN EARTH SOIL.

A.B.P. Abeyratne Bandara, R.B. Mapa of Faculty of Agriculture, University of Sri Lanka, and H. Somapala of Regional Agricultural Research Centre, Makandura, Gonawila (N.W.P).

The quantification of physical parameters of soil is important to intensify Agriculture.

This study was done at Thambuttegama. This location is in Mahaweli Project System H (DL$_1$ Agro-Ecological zone) The aim was to evaluate the physical soil fertility factors.

The results show that the soil physical factors at different places of a catena varies (significantly) according to the depth of the soil, and its drainage condition.

No physical factor functions independently. They depend on one another. Correlations were observed among different physical parameters in their behaviour.

This study indicated that soil physical parameters influence soil physical fertility factors such as soil moisture availability, soil aeration and soil mechanical impedence.

Introduction:

The increasing demand for food, and the limited availability of cultivable land, creates a need to increase production per unit of cultivable land.

The majority of the lands available for arable annual cropping are within the dry zone of Sri Lanka. Reddish Brown Earth soil is the dominant great soil group in the dry zone (Moor man and Panabokke, 1961). It occupies 3.6 million of acres. Over 2/3 of the total paddy lands of the country are found in the group of Reddish Brown Earth soils. Also these soils compose a major component of the soils in the Mahaweli diversion (Multipurpose) Project.

Intensification of crop production can be achieved by improving and maintaining the soil fertility. Therefore the study of soil fertility of Reddish Brown Earth in the dry zone must be given priority.

Soil physical characteristics play a major role in determining the status of soil physical fertility factors, and also is useful in addressing irrigation and soil erosion problems. The important physical characteristics are soil texture, structure, porosity, Bulk density, Soil consistency and soil strength. These physical attributes influence plant growth through their effects on soil moisture availability soil aeration, soil temperature and mechanical impedence.

Therefore to improve productivity of a soil suitable physical characteristics in the soil must be developed. Better understanding of those characteristics help the agriculturists to develop the physical status of soil, that help good plant growth.

The objective of this investigation was:

1. to study the soil physical characteristics in three drainage associates of Reddish Brown Earth soils and,
2. to evaluate the effects of these parameters on soil physical fertility factors such as soil aeration, soil moisture content and soil mechanical impedence.

Mataerials and Methods:

Location

The site selected for this Study was Thambuttegama, 16 miles south of Anuradhapura within the H area of Mahaweli development project, (DL_1 Agro-Ecological zone).

Topography

Topography at the site is undulating to rolling. The study area consisted of a catenary unit having three drainage classes:-

1. The well drained (W.D.) class located at the upper aspects of the catena,
2. The imperfectly drained (I.D) class located at the middle aspects of the catena, and
3. The poorly drained (P.D.) category occupied tahe lower aspects of the catena as shown in the Figure 1.

Table 1.

SOME PHYSICAL CHARACTERISTICS OF SOILS FROM A CATENA OF REDDISH BROWN EARTHS.

Drainage member	Horizon	Land slope %	Soil Depth (cm)	Percentage of Sand	Silt	Clay	Organic matter.	Texture	Time taken for dispersion
W.D.	A	1.5-2.0	0-15	83.45	8.50	8.04	1.47	LS*	12 hours
	B_2		15-75	67.96	10.50	21.54	0.87	SCL*	90 seconds
	B gravel		75-175	65.76	10.70	23.54	0.08	SCL	15 secpmds
	C		175	90.36	3.40	6.24	0.02	Sandy	5 seconds
I.D	A	1.0-1.5	0.25	81.62	6.10	12.28	1.16	SL*	10 hours
	B_2		25-75	71.48	5.50	23.04	0.32	SCL	45 seconds
	B gravel		75-175	70.18	5.80	24.02	0.08	SCL	20 seconds
	C		175	-	-	-	-	-	-
P.D.	A	0.5-1.0	0-30	78.46	4.00	17.54	1.86	SL	13 hours
	B_2		30.105	76.36	4.10	19.54	0.59	SCL	45 seconds
	B gravel		105-175	66.08	10.44	22.88	0.04	SCL	10 seconds
	C		175	-	-	-	-	-	-

* LS = Loamy sand SL = Sandy Loam SCL = Sandy clay loam.

Measurements:

The following laboratory and field measurements were carried out for the samples from each horizon of each drainage class.

Laboratory Measurmeents:

Parameter

1. Soil Texture

   Mechanical analysis was done according to the Hydrometer method (Bouyoucous, 1951) for the particles 2 mm in diameter. Three replicates were used for each horizon

2. Organic matter

   Walkley and Black (1934) method. Three replicates per horizon were tested.

3. Plasticity Index:

   Determination of plasticity limit and liquid limit according to the Black et al (1965) method. Three samples for each horizon.

4. Bulk Density:

   Undisturbed core samples were used to determine bulk density. Three samples were used per horizon.

5. Porosity

   Bulk density and particle density were estimated to determine total porosity.

6. Aggregate stability

   Seives of 2000 m and 250 m aperture diameter used for both dry and wet seiving tests to determine Wet and Dry aggregate stability. Two tests for each horizon.

7. Dispersion rate of Aggregates

   Emerson's (1954) method was used to estimate the dispersion rate of aggregates. Three tests per horizon.

Field Measurements

1. Soil strength

This attribute was estimated in the field (in-situ) using a recording type penetrometer having a cone of 8 mm diameter. 10 tests for each drainage category were made. Tests were conducted at comparable moisture contents.

2. Infiltration Rate

Infiltration tests were conducted using double ring infiltrometers of Eijkelkamp type. Duplicate runs were carried out per drainage associate.

RESULTS AND DISCUSSION

Land slope and depth of soil horizon.

Land slope and depth of different soil horizons of the three drainage associates are shown in Table 1. According to these results a correlation was observed between the land slope and the thickness of A-horizon. Variation of depth in A horizon among different drainage categories is probably caused by continuous soil erosion. The well drained soil has the highest erodibility because this soil is always at upper aspects of catena with the highest land slope. Soil erosion may be the reason for the lowest thickness of A horizon of this drainage group. The lowest soil erodibility is exhibited by the poorly drained group which is located at lower aspects with the lowest land slope, where the eroded material from upper and middle aspects of the catena is deposited. Therefore this drainage member possessed the highest depth of A horizon while the imperfectly drained class exhibited the moderate depth of A horizon.

Soil texture

Soil textural data (for the three drainage classes are in Table I. Texture of the A horizon seems to exhibit desirable conditions (for better plant growth) such as good moisture holding capacity, better aeration and sufficient voids for better root growth. The B horizon due to the increased amount of clay, may have greater water holding capacity, but soil aeration is likely to be poor and as well as increased the mechanical impedence.

A correlation was seen between the land slope and the soil textural data. The variation of clay content along the surface horizons is probably due to migration of clay particles. Due to the small particle size, the clay particles are carried further down along the slope and deposited at lower aspects of the catena.

Organic matter content:

Soil organic matter contents of all the three drainage classes are shown in Table I. These data indicate that the organic matter content decreases with the depth of the horizon. Ill drained condition of the soils at lower apsects of catena, decreases soil aeration leading to restricted organic matter decomposition. Therefore this soil (P.D) contains higher amounts of organic matter due to the accumulation.

Dispersion rate of aggregates

Results of the Emerson's dispersion rating tests are also shown in Table 1. Surface soils always possess higher stabilities than that of subsurface soils.

Good relationships can be seen between the organic matter contents and the dispersion rate of aggregates. The highest organic matter content and the lowest dispersion rate could be observed in the A horizon of the poorly drained class. Organic matter content of the imperfectly drained surface soil is lower than that of similar horizon of well and poorly drained groups. The dispersion rate of soils at imperfectly drained A horizon is higher than that of the well and poorly drained A horizon soils. Thus the poorly drained surface soil possess the highestaggregate stability while the well drained surface soil have moderate aggregate stability and the imperfectly drained surface soil, had the lowest aggregate stability.

With increasing depth of soil, the clay content too increases while the organic matter content decreases. Dispersion rate also increases with the depth of all three drainage classes. By increasing the cohesion between soil particles, both decomposed and undecomposed ortanic materials contribute to stabilized soil structure. There-fore where the amount of soil organic matter is high, the cohesion forces are also high. As such even when this soil is wetted, the surface tension forces are not strong

enough to slake aggregates. Therefore, soils with high organic matter, show higher aggregate stabilities In the sub-surface horizons the organic matter percentages are low while the clay percentages are high Bonding by clay is not so strong as those due to organic matter. Therefore, aggregate stability in subsurface horizons is lower.

Stability of aggregates of different sizes.

According to the dry seiving data in Table 2, the aggregates between 250 m and 2000 m diameter possessed higher stabilties compared to the aggregates in the range of 2000 m and 250 m diameter. It is also observed that in all the drainage members the A - horizon have higher weight propotions of particles above 250 m. This indirectly shows that A - horizon contains higher amounts of stronger aggregates than the B - horizon. B - gravel horizons are not compared (for the same effect) as it was observed to contain relatively high percentage of gravel.

Wet seiving data are also shown in Table 2. Only the gravel particles remained on the seive (size 2000 m diameter size have no stability to wet seiving. But considerable amounts of aggregate having size 2000-250 m show stability to wet seiving. Further the stability of 2000-250 m size aggregates to wet seiving was higher thant that of the B - horizon.

Soil consistency

Soil consistency data are shown in Table 2. Always the plasticity index of subsurface soils are higher than surface soils. Further plasticity index of the poorly drained A horizon soils were higher than that of well and imperfectly drained A - horizon soils. According to these data it could be expressed that, the poorly drained group surface soils' workability is lower than that of well and imperfectly drained categories.

A correlation between soil textural values and consistency values were seen. As subsurface (B-horizon) soils had relatively high amounts of clay, their liquid limits are higher than the soils from A horizon. This leads to increased plasticity index of subsurface soils. The relatively high plasticity index of subsurface soils. The relatively high plasticity index of poorly drained surface soil is probably caused by tahe presence of relatively higher clay amounts.

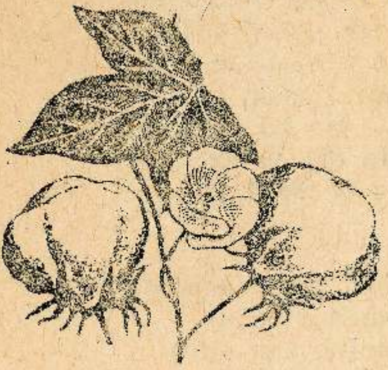


Table 2.

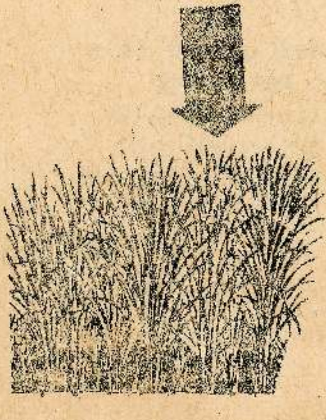
CONSISTENCY AND AGGRIGATE STABILITY LEVELS OF SOILS FROM A CATENA OF REDDISH BROWN EARTH.

Drainage Class	Horizon	Liquid limit %	Plastic limit %	Plasticity index	Dry Sieving Results 2000 m %	Dry Sieving Results 2000-250 m %	Dry Sieving Results 250 m %	Wet Seiving Results 2000 m %	Wet Seiving Results 2000-250 m %	Wet Seiving Results 250 m %
W.D	A	18.31	14.00	4.31	41.43	42.90	15.97	7.90	32.04	60.06
	B	25.00	16.74	8.26	38.90	39.21	22.49	7.20	29.60	63.20
	B gravel	23.00	15.90	7.10	25.25	35.50	39.25	34.52	8.86	56.60
I.D.	A	17.80	15.70	2.10	17.18	64.36	19.30	4.00	47.44	48.56
	B_2	21.00	16.90	4.10	14.87	56.70	29.13	2.86	39.60	57.52
	B gravel	22.[illegible]	14.90	7.50	37.28	40.50	22.22	11.92	55.72	54.36
P.D.	A	30.76	17.80	12.96	19.92	59.73	20.35	2.32	43.37	54.31
	B_2	25.70	20.28	5.42	19.72	54.85	25.43	4.24	43.24	52.52
	B gravel	25.06	17.27	7.79	28.98	42.64	28.38	25.55	30.27	44.18

W.D. = The well drained class located at the upper aspects of the catena.

I.D. = The imperfectly drained class located at the middle aspects of the catena.

P.D. = The poorly drained category located at the lower aspects of the catena.



Soil Bulk density

Table 3 exhibits the bulk density status of different soil horizons. Always subsurface soils have higher bulk densities. And the poorly drained surface soils show relatively higher bulk density than shown by surface soils of other drainage classes.

There is a distinct relationship between soil texture and bulk density in all three drainage classes. Soil texural data Table 1 correlates with the bulk density data in Table 3. TAh soils that had relatively higher percentages of clay also had relatively higher bulk density values. That is probably because of reduced porosity due to clogging of soil pores by clay particles. This may be the reason for relatively higher bulk densities of soil in the subsurface horizons.

Further the surface soils in the lower aspects contained relatively higher percentages of clay. These higher clay amounts while reducing the soil porosity increases the soil bulk density. Relatively low clay percentages, as well as, low bulk density values are exhibited in the surface soils at upper and middle aspects of the catena.

A relationship was seen between the organic matter content and the bulk density and porosity levels of soil. In soil layers where organic matter content is high, the bulk density is low. Mainly in the A - horizon a significant accumulation of organic matter was observed. It promotes good soil structure. This results in an increase in porosity and also reduction in soil bulk density.

Also the regular loosening of the surface soil layer by cultivation brings about a significant reduction of the bulk density of the layer of soil at the surface.

Presence of high plasticity index values is a characteristic feature of soils which have high bulk density values. High bulk density is mainly due to high amount of clay. This high amount of (sticky) clay also causes increased soil plasticity index.

Table 3.

SOME PHYSICAL CHARACTERISTICS OF SOILS FROM A CATENA OF REDDISH BROWN EARTH.

Drainage category	Horizon	Bulk density (grs/cm^3)	Porosity % (volume)	Steady infiltration. cm/hr.	Registeance Kg/cm^2	Moisture * %
Well drained.	A	1.47	44.60	8.0	957.8	7.63
	B_2	1.67	37.00		1235.3	
	B gravel	1.69	36.20		-	-
	C	1.63	38.50		-	-
Imperfectly drained	A	1.31	50.70	14.0	395.5	6.66
	B_2	1.57	40.80		936.8	
	B gravel	1.65	37.70		-	-
Poorly drained	A	1.52	42.70	4.0	1010.2	8.32
	B_2	1.58	40.40		1264.0	
	B gravel	1.62	38.90		-	-

* Moisture content of soil whenthe soil reistence tests were done. The moisture content does not show significant variation among the drainage groups.

Soil strength

The data of soil resistence to penetration tests are shown in Table 3. The sub-surface soils always possessed higher soil strength values than the surface soils. Further the strength of poorly drained group soils was higher than the well and imperfectly drained groups of soils. High soil strength is undesirable for plant growth because it adversly affect root penetration. Therefore better of crop growth could be expected in well and imperfectly drained groups of soils.

The soils having high amounts of clay possess higher mechanical impedence. It is clarified by higher mechanical impedence values in subsurface horizons. The poorly drained surface soils which contain relatively higher amounts of clay, also have higher soil strength values. Thus due to the high soil strength of poorly drained soils they have to be cultivated prior to planting a crop.

The bulk density parameters always correlates with the soil resistence to penetration. In the soils where the bulk density is high, the soil strength also is high. This is probably because of low porosity of such soils.

Infiltration rate

Details of infiltration rating tests are also shown in Table 3. Possessing very low infiltration rates is a common feature of these soils. That is probably because of the presence of compacted B-horizon where soil pores are clogged by illuviated clay particles. The steady infiltration rate of well and imperfectly drained groups is always higher than that of the poorly drained soil group. This type of infiltration rate of both well and imperfectly drained soil groups improves the drainage of these lands. Therefore the suitability of these lands for upland crops is high. However, under the Mahaweli scheme, these lands are at present used for paddy cultivation with supplementary irrigation. The farmers always try to retain some amount of water at the surface of the soil in paddy lands and it is very difficult on these soils due to its high infilitration rate. Therefore it could be concluded that the suitability of these soils for paddy cultivation is low. The low infilitration rate of the poorly drained soils, provide desirable conditions for paddy cultivation. Alternatively the potential of the latter soil group for upland crops are relatively low.

A correlation between steady infiltration rate and the soil texture was observed. The clay content of both well and imperfectly drained surface soils, is relatively lower than that of poorly drained soils. Consequently, a high soil porosity could be expected in soils on the upper and middle aspects of the catena. The infiltration property of the above soils were also observed to be high. The high clay content on the poorly drained group decreases the amount of macro pores and reduces the steady infilitration rate.

A close correlation was observed between the soil bulk density and the steady infilitration rate The imperfectly drained surface, soils which possess the lowest bulk density value exhibited the highest steady infilitration rate. The lowest infiltration was shown by the poorly drained surface soils which also had the highest bulk density.

Results of this investigation show that the physical fertility of soils (on different drainage members of a catena at Thambuttegama withinthe 'H' area of Mahaweli Project zone) differ significantly.

Further this study shows that each physical soil factor completely depends on the other physical factors. This is how they function inthe resultant level of soil fertility.

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The Cultivated Mushrooms

The mature mushrooms consisted of the cap, and and the stalk. The cap is expanded umbrella like structure which is upported by the stalk. In the cultivated mushroom this cap is white. On the under surface of the cap are the gills, atheir folds radiating from the point of attachment of the cap to the stalk. The gills produce spores which,under appropriate conditions, serve as a means of reproduction for the fungus. Many millions of spores, which are purplish black, may be developed by a single mushroom. The gills of the young mushroom are pink, bu the colour darkens and finelly turns almost black as the mushroom becomes older.

The young unopened mushroom is as a button. The gills are not visible at this stage, as they are covered by the veil which extends from the edge of the cap to the stem. As growth proceeds, tahe cap expands and the veil is torn, exposing the gills. A remnant of the veils, known as tahe "ring" is left attached to the stem.

Mushrooms do not require sunlight for development They are grown in sheds or houses because tahese permita control of temperture and moisture.

Continued on page 41.

BOMBAY ONION SEED PRODUCTION EXPERIENCE AT KALPITIYA.

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Introduction

Onion (Allium cepa.) is popular both as a vegetable and spice crop, in Sri Lanka. The two major types of onion grown in Sri Lanka are

1. the small onions commonly called the "Red onions' and
2. the big onions commonly called 'B onions'.

In the Kalpitiya Penninsula onion production has achieved considerable progress in the recent past. In this area the most widely cultivated type is 'Red onion'. There are two common varieties of red onion grown in the area.

1. 'Mal Lunu' (Vethalam) the most popular variety and grown throughout the year and
2. Small red onion variety called 'Shallots" grown during the maha season.

'Mal Lunu' produces true seeds under Kalpitiya conditions. This has contributed to it's popularity among cultivators in the area, and the production and use of true seeds of this variety is becoming more popular than the use of as seed bulbs as planting material in this area. The studies done by the Economics Division of the Department of Agriculture has revealed that B.Onion is the most profitable crop in the area. However at present the B.Onion production in this area is restricted to a low level. This is due to non-availability of seed during the Planting season and also the poor storability of the B.Onion true seeds.

B.Onion seed production programme:

Several varieties and lines of B.Onion, mainly from India and Ethiopea were collected during 1983 Maha season. These collections were evaluated continually during the last four years at the Agricultural Research Station, Kalpitiya to estimate their

1. bulb yield
2. quality
3. ability to flower and produce seeds under local conditions. Mass selection was practiced by discarding undersirable types at various stages.. of crop growth

Methods of seed production:

The main methods of B.Onion seed production were,

The seeds were sown in May - June, transplanting seedlings was done in July - August.

After transplanting seedlings, the bulbs were left in the field and allowed to regrow, bolt and flower in the field (in situ) Bolting startes in December - January and the seeds were ready for harvest during the period, April - May. With this method poor bolting and low weed yields were observed. Also the seed to seed method excluded any possibility of selection for bulb quality (as the bulbs were nut lifted from the soil)

. Bulb to seed method

The seeds were sown in nurseries in May - June. Seedlings were transplanted in July - August. Bulbs were ready by September - October. Bulbs e were harvested at maturity and cured in the field for 4 - 5 days and carefully selected bulbs were stared for 2 - 4 weeks and then replanted in the field to flower and produce the seed. The seed yield and the percentage bolting were high when this method was adopted. Selection of bulbs was essentially for bulb quality.

Use of dry-sets

Seeds were sown in the nurseries in March - April and the seedlings were allowed to grow in the nursery for 10 - 12 weeks to produce mature dry-sets. The dry-sets were harvested and stored for 2 months. In October - November the dry-sets were replanted in the field; bolting occured in December - January. Seeds were ready for harvesting during March - April

The first two are conventional methods of seed production. The third method (use of dry sets) is prefered under Kalpitiya conditions. The high air

temperature and excessive wind velocities prevailing in the area during the months of July and August adversely affect the growth of the onion crop. The use of dry setts provides the seed produces an oppotunity to evade the expolsure of the crop to the adverse effects of temperature and wind stresses. During July - August period (because the dry setts one kept in the stores during this period)

Climatic requirements :

Bolting is strongly influenced both by day length and temperature. Therefore it is important to adjust the time of planting the seed crop to synchronize bolting with the cooler period of the year (December - January) is the cooler period in Kalpitiya area)

Seeds, Seed sowing, Transplanting and After care:

Eight to ten Kg. of seed is sufficient to raise seedlings for planting one hectare. Seeds may be sown in flat beds. Sowing is done in continuous lines spaced at 5 - 10 C.M distance. The normal bed size is 3m x 1m. When the seedlings are 12 - 18 cm tall (6-8 weeks) and 0.6 to 0.9 cm thick at the base, they are considered ready for transplanting. (in the bulb to seed' method) Transplanting seedlings in the field is done at a spacing of 15 x 10 cm. When the bulbs are ready for harvest, any further vegetative growth must be suppressed through careful thrashing of the green tops, using a smooth stick. After thrashing irrigation is stopped and the harvesting is done 3 - 4 days later.

Bulb, Selection, Storage and the Seed crop:

Select and remove the injured, totten, thick necked, bolted, twin bulbs and off types. Bulbs having the diameter of 2.5 to 3 cm are best for planting. Tie the selected bulbs into small bundles Stroed the bundles in a well ventilated place. Plant selected bulbs in a well prepared field at a spacing of 30cm x 30cm. To plant one hectare 2500-3000 kg of bulbs is required.

Onion is a highly cross-pollinated crop. A distance of 400 m between varieties must be kept. Rogue Diseased and off type plants before flowering commences.

Attempts to improve the seed yield through increased pollination by introduction of honeybees were not shown any convincing results.

All the seed heads do not mature simultaneously. Therefore staggered harvesting must be practiced. When the seeds inside the capsules become black, cut the umbels. Thresh the capsules when they become brittle and break readily.

Kalpitiya types:

Four (4) promising types of B.Onion have been identified during the past four years through continuous selection. Some characters of these types are shown in Tables 1 and 2.

Table 1. Some important characters of the Bulb crop

Types	Colour	shape	average bulb diameter	weight of 10 bulbs in gm.	%twin Bulbs
K1-1	red	globular	4.5 cm	545	10.5
K1-2	red	globular	3.8 cm	360	8.6
KE-1	scarlet red	globular	4.0 cm	525	5.2
KE-2	scarlet	globular	3.2 cm	325	3.5

Table 2. Some important characters of the seed crop

Type	% flowering	average seed weight in gm per flower	average number of seeds per flower
K1-1	51.3	1.64	615
K1-2	48.2	1.71	514
KE-1	67.5	1.20	335
KE-2	55.2	0.93	315

samples of seed from these four types were distributed among some selected farmers within the Kalpitiya penninsula for observations on growth and yield during 1987 Yala season. The selection programme will be continued based on these observations.

MUSHROOM GROWING

By growing mushrooms it is possible to produce food of an excellent quality from all kinds of vegetable waste such as bark, sugar cane bagasse, coconut fibre, different kinds of cereal straw, corn cobs or different mixtures of saw dust, rice bran etc. Moreover, it is the kind of cultivation that is, in general, not restricted to one season; thus mushroom growing can provide work the year round. Besides cultivation on a small scale in order to produce protein-rich food for the table, one can consider growing larger quantities for sale.

(To be continued)

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