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A NEW METHOD FOR CONTROLLING WEEDS IN RICE NURSERIES.

By
P.C. Dharmaratne, Experimental Officer,
Kosala Jayawardena, Experimental Officer,
R.A.R.C. Bombuwela.

Introduction:

Weeds grow with rice and compete for water, nutrients, light and space, This causes a loss of 20-40% in the crop yield. Some weed species such as Echinocloa Spp function as alternate hosts for a variety of insect pests and plant pathogens. (Chaundry. 1971, Dixit et al 1968).

One of the most important methods of minimising weed competition and the consequent yield reduction is transplanting instead of broadcasting, where by the rice crop gets a head start over the weeds. However there is a possibility of transplanting weeds along with rice seedlings especially, those weed species, which cannot be distinguished from young rice plants such as Echinochloa crus-galli.

The beneficial effect of transplanting is drastically reduced if weeds are also transplanted along with rice seedlings. Therefore to prevent any weeds from being transplanted to the field from the nursery an effective method of weed control in the nursery itself becomes imperative.

Hence the following study was undertaken at the R.A.R.C. Bombuwela to find a suitable and a convenient method of controlling weeds in the nursery.

Materials and Methods:

This experiment was carried out at R.A.R.C., Bombuwela in 1986/87 Maha and 1987 Yala seasons using rice varieties BW 351 (3½ Months) and BG 408-1 (4½ months)
The recommended quantities of herbicides such as Propanil (3-4 DPA) Butachlor (Machete) and oxydeozone Propenil (Kenata PL) were applied after sowing, to the rice nurseries.

Plot size used was 2x2 meters, and while 3-4 DPA and Ronsta PL were sprayed 10 days after sowing, Machete was applied 6 days after sowing. The control was not treated with any herbicide.

Rice seedling counts, weed count and Phytotoxicity to rice seedlings, was assessed just before application and 5 days after application of herbicide.

Results and discussions:

Weed control efficiency in rice nurseries by these herbicides was similar in 3½ month variety and 4½ month variety. 3-4 DPA, Ronsta-PL and Machete effectively reduced weed infection in rice nurseries. Use of prepanil (3-4 DPA) at 10 days after sowing in the nursery is good for controlling Grassy weeds specially Echinocloa crusgalli. Table 1 and 2. Little phytotoxicity has been observed in rice nursery due to Propanil and it recovered after one week.

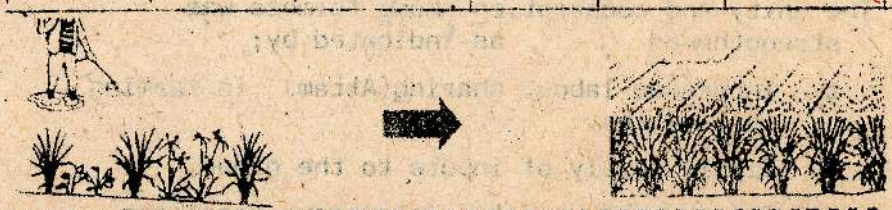
In this experiment, there was no yield reduction due to the application of herbicides to the rice nursery.

Table 1 : Effect of herbicides on growth of seedlings of BW 351 (3½ months) and weed control efficiency.

Treatments.	Rate of application ml/50m^2	Healthy seedling percentage after spraying herbicides.	Percentage of weeds controlled		
			Broad leaved weeds	Sedges	Grassy weeds
3-4 DPA	43	98%	87%	87%	63%
Machete	8	95%	36%	87%	31%
Ronstar FL	18.5	87%	95%	81%	26%
Control	-	100%	-	-	-

Table 2: Effect of Herbicides on growth of seedlings (Variety BG 400-1, 4½ months) and weed control efficiency

Treatments	Rate of application ml/50 m^2	Healthy seedlings percentage after spraying herbicides	Percentage of weeds controlled.		
			Broad Leaved weeds	sedges	Grassy weeds
3-4 DPA	43	98%	100%	100%	94%
Machete	88	82%	32%	32%	30%
Ronstar PE	18.5%	95%	10%	38%	32%
Control		100%	-	-	-



A Note from the Editor

Please send articles for publication in Krushi, along with your name, designation and address.

Your constributions will help to produce a better quality bulletin, and also enable production on schedule.

Your co-operation is our inspiration.

ACHIEVEMENTS IN THE BLOCK DEMONSTRATION PROGRAMME IN GAMPAHA DISTRICT.

I M Gunawardena ADA (Information)

Education & Training Division

Department of Agriculture, Peradeniya

1. Repayment rate of the loan is 100% in all Block Demonstrations (BD) in this district.
2. The group saving of 20% of the total loan is maintained successfully each season.
3. The average yield of paddy increased from 2.3 T/ha to 4.3 T/ha after the BD programme.
4. Cost of production was reduced by -
   a) Increasing sharing of labour.
   b) Use of straight fertilizers instead of mixtures.
   c) Use of Integrated Pest Management practices leading to the minimum use of pesticides.
5. The unity and cooperation among farmers was strengthened as indicated by:
   a) Increased labour sharing(Attam) in farming activities.
   b) Timely supply of inputs to the group.
   c) Improvement on water management practices.
   d) All the farmers grew new improved rice varieties.
   e) Active participation and collective involment of the farmer group in cultural, social and religious activities of the area.
6. The BD programme has helped in the adoption of new technology in the adjoining farm land.

Activities and achievements

1. Name of Yaya - Pitiyegedera "Sri Buddhapriya" Farmers' Association.
2. AI Range - Bemmulla
3. ASC Area - Bemmulla. Division.
4. K.V.S.N. Area - Bemmulla.
5. CO Area - Pitiyagedera

6. Extent of BD - 7.5 ha.

7. No.of farmers of the BD - 22 farmers

8. Variety of Paddy - BG-450

9. Cropping System - Transplanting 7 ha.
Broadcasting 0.5 ha.

10. Irrigation system - Major irrigation.

11. Starting date of BD - Maha 1988/89 (Sept./Feb.)

12. Formation of Block Demonstration:

A preliminary survey/Bench mark was conconducted in the selected Block Demonstration Yaya taking into careful consideration the cost of inputs vs. yield obtained in 1987/88 Maha and 1988 Yala. Data was obtained by interviewing farmers.Crop cutting surveys conducted in this yaya indicate the average yield to be 2.3 tons/ha. The estimated input cost for this BD is Rs.24,600/-

13. Formation of Farmers' Association :

On the 2nd August, 1988 farmers of this BD were summoned for the inaugural meeting and an association known as "Sri Buddhapriya" Farmers Association was formed with farmers as ex-officio members of the association.

14. Financial Transactions:

The Divisional Officer of the Agrarian Service Centre, Bemmulla opened a separate bank account in favour of this association.

15. Training Programme :

Once a month the farmers of this association meet and discuss the cropping calender/programme for the yaya. Training classes are also conducted for them. So far, 7 training classes have been conducted.

16. Input supply to BD farmers :

The seed paddy requirements of farmers was met by issue of registered seed. Arrangements were made to establish a private seed farm within the BD to satisfy future requirements of seed paddy. Basal fertilizer was supplied to the BD as straight fertilizer, that enabled a saving of Rs.4,894 and 2 cents.

as straight fertilizer whereby the 22 farmers of the BD were able to save a sum of Rs.4894/02.

17. Expenditure incurred in using straight fertilizer:

(a)	Conc. Super Phoaphate 995 kg. @ Rs.3.77 per kilo	=Rs.3751.15
(b)	Muriate of Potash 821 kg. @ Rs.3.67 per kilo.	=Rs.3014.90
(c)	Urea 340.5 kg @ Rs.3.77 per kilo	=Rs.1283.68
	Total expenditure incurred	=Rs.8049.73

18. Expenditure incurred if pellet or granular fertilizer was used :

(a)	Pellet fertilizer 2968.75 kg @ Rs.4.36 per kg.	=Rs.12943.75
	Amount saved by farmers ...	=Rs. 4894.02

19. Estimated expenditure for the BD:

(a)	Seed paddy	= Rs. 4252.50
(b)	Fertilizer	= Rs.16669.36
(c)	Herbicides	= Rs. 1116 50
(d)	Pesticides	= Rs. 2049.00
	Total :	= Rs.24087.36
	Crop insurance	= Rs. 1540.65

20. End of Maha Season :

Yield estimates made through results of crop cutting surveys indicated the average yield of the Block Demonstration to be 4.5 tons/ha. The total loan recovered was Rs.24,087 and 36 cents. Twenty percent (20%) of group saving was Rs.4817 and 50 cents.

Twenty two reasons why Farmers prefer to grow Rice in the paddy fields instead of Subsidiary Food Crops.

****

W. Ratnayake,
Addl. Deputy Director (Extension)

Promotion of subsidiary food crops(SFCs) in paddy fields accords with the national policy of improved agricultural productivity of the existing paddy lands. Besides the high profit margin SFC provide crop diversification is the only way to share the most limiting resource; the water. Many farmers are aware of the advantages of diversifying their crops, but many reasons prevent practice of diversification. Most of the reasons are not straight forward economic issues. Some farmers have experienced alarmingly low yields when SFCs were grown for the first time. Hence a good understanding of these reasons is essential for promoters of subsidiary food crops cultivation in paddy fields.

The matrix provided here tries to summerise the comparative advantage of growing rice as an average FARMER SEES them. However, one should not try to pass a judgement by comparing the sum totalof of advantages as crop diversification has its own distinctive merits. The reader is also cautioned of the limitations in generalising such statement in matrix study.

	Paddy	SFC
1. Food Security	More secure being the staple food storability and ready market	Less secure
2. Experience	Farmers already possess. It is a traditional crop.	Relatively new
3. Yield stability	Stable	Fluctuates
4. Price	Stable	Fluctuates

	Rice	SFC
5. Marketability	Ready market (place and time)	No ready market. fluctuates.
6. Inputs	Less	More
7. Financial investment	Less, could largely manage with own resources.	More
8. Attention	Less, spare time for other work.	Needs continuous attention.
9. Extensibility	Could be extensively cultivated.	Extensive cultivation is restricted.
10. Seasonality	An all season crop.	Restricted to Yala.
11. Land suitability	Any drainage class	Restricted to well drained to moderately well drained land classes.
12. Pest and diseases	Less	More
13. Labour requirement.	Less	More
14. Labour skills	Already possessed	To be acquired
15. Seeds material	Readily available Less expensive	Highly seasonal more expensive.
16. Harvesting	One-shot operation could be prolonged.	Usually more than one operation, difficult to prolong.
17. Post harvest operations	Could be postponed. Needs less space for stacking earheads during an emergency.	Not possible to delay with most crops.

	Rice	
18. Seed Dormancy	Sufficient to escape short spells of bad weather at harvest	Too short seed dormancy period. Must be harvested at maturity without delay.
19. Seed viability	Satisfactory to retain own seed material for longer periods.	Too short, Need replacement of seed more often.
20. Storability for consumption	Satisfactory	Most commodities cannot be stored for long periods without special care.
21. Theft problems	Not serious	Very serious
22. Byproduct (straw)	High demand for thatching and as a cattle food	Less useful.

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DO YOU KNOW?

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Please turn to Page 35

O R I E N T A T I O N

I.M. Gunawatrdena,
Subject Matter Specialist (Communication)

om the view point of a trainer:

- Orientation is the process of guiding and assisting an individual to visualise, perceive and then correctly see his position in relation to certain situations, procedures and programmes. This implies the necessity to evaluate ones position (in the organization to which he belongs) and objectively examine his own attitudes, values, strengths and weeknesses in relation to what the organization expects of him. This can be achieved when an individual is willing to appreciate those points of view which are not his own.

- When any individual gets used to routine work, and is made to work under pressure, he has no time to see objectively how he and his contribution fits in as a part of the total system. If a man gets lost in routine work and attached to methodological short cuts, these can impose a limit on his interests and restrict his attention to a limited area thinking them his vision becomes narrow.

- Narrowness of vision leads to a rigidity of out look and willingness to accept tradition rather than innovative, approaches.

- What should be our approach to orientation? Orientation implies broadening ones out look and increase his willingness to attend, consider, and appreciate the view points of others.

- While the organization, superiors, trainers or the environment can provide the stimuli needed, orientation only blossoms through the warmth of conscious efforts of the in dividual concerned.

MAIZE IN A MIXED CROPPING SYSTEM

P.W.S.M. Samarasinghe
Adaptive Research Unit,
Polonnaruwa.

In Polonnaruwa district farmers grow maize for young cobs. In recent years cultivated extents have decreased due to low income. This experiment was conducted in the Polonnaruwa Adaptive Research field and in a farmer's field to find out a suitable inter -crop to grow with maize to increase the production per unit area of land.

The experiment conducted at the adaptive research field and a farmers field in maha 1986/87 and maha 1987/88 involved the following treatments, in a randomized complete block design with three replicates.

Maize + Black gram - In these plots maize seeds were dibbled in rows, 120 cm (4') apart and within row, 22 cm (9") apart.

Maize + green gram - 1 plant/hill, between 2 rows of maize 2 rows of legume were planted. The distance between hills was 15 cm (6") with 2 plants/hill.

Maize + Ground nut	45 cm (1½') and distance between hills was 15 cm (6") with 2 plants/hill.
Maize only	Maize planted in rows, 60 cm (2') apart and within row, 45 cm (18") with 1 plant/hill to get the same plant population in both mixed and mono crop plots.

Departmental recommendation of fertilizer to the second crop was given to the mixed cropped plots.

In comparing the yield of maize (young cobs) in mono crop treatment with the other treatments involving mixed stands, it is seen that the yield of maize did not change significantly by the inclusion of the legumionus crops (Tables 1 & 2). Among these combinations, maize+ground nut appeared to be the best.

Thus, maize can be mixed-cropped with groundnut in the dry zone for better monetary returns.

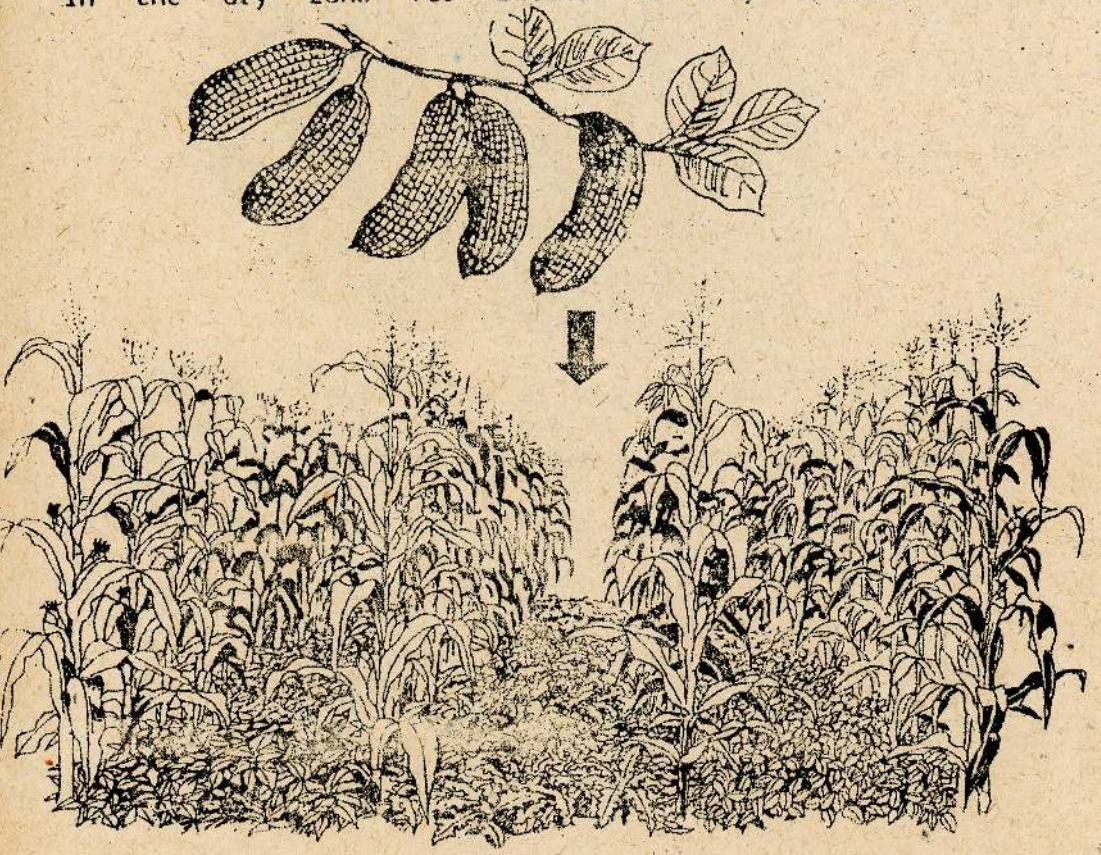


Table - 2: Crop yields in research and farmer's field - Maha 1987/88.

Treatment	Research field		Farmer's field 1.		Farmer's field 2.	
	Maize, cobs/ha	Legume, kg/ha	Maize, cobs/ha	Legume, kg/ha	Maize, cobs/ha,	Legme, kg/ha
Maize+B.gram	29,500	1090	27,500	950	28,750	825
Maize+G.gram	27,250	375	26,250	225	23,250	300
Maize+G.nut	23,250	1837	22,250	1525	25,500	1475
Maize only	26,000	-	24,500	-	28,000	-
CV %	11.1		15.3		14.7	
LSD 5%	N.A.	461	N.S	608	N.A.	568

N.S. = Not significant.

EFFECT OF SPACING ON YIELD OF CHILLI

P.W.S.M. Samarasinghe,
Research Officer,
Adaptive Research Unit,Polonnaurwa.

Chilli is an important spice. Its cultivation extents have increased considerably as a result of import restriction. Chilli production per unit area of land could be increased through the application of appropriate management practices. This experiment was conducted to find a suitable spacing for the precently recommended chilli variety MI-2 as sufficient information on this aspect is not available.

This experiment was carried out at Polonnaruwa (Reddish Brown Earth) during the seasons Maha 1986/87 Yala 1987, Maha 1987/88 and Yala 1988. Six different plant spacings were evaluated in a randomized complete block design with 3 replicates (Table 1).

From the data (Table 1) it is clear that in all seasons except Maha 1986/87 the spacing of 60 cm x 45 cm has given significantly higher yields than the other spacings tested. Plant height increased with plant density. Number of pods per plant was the most variable component.

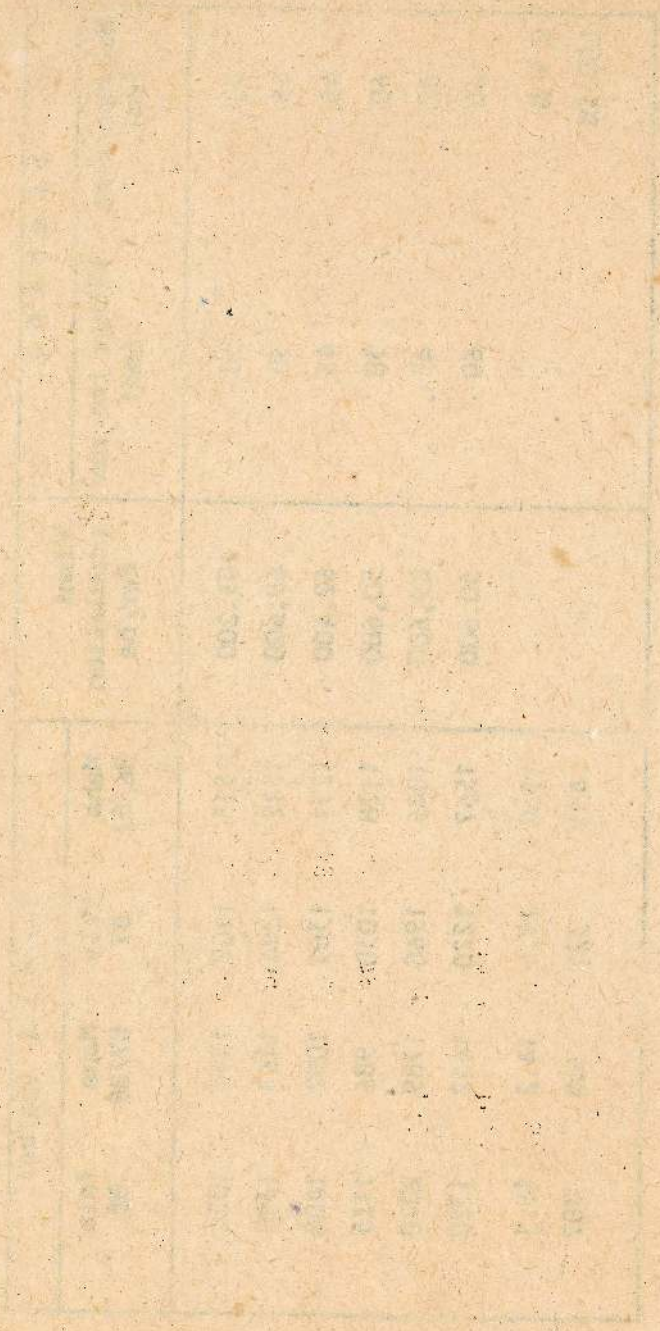
Close row spacing and increased plant population hinders the availability of light to the plant ultimately affecting the yield. On the other hand, due to closed spaced crop between rows, it will be difficult to carry out the cultural operations. It was also observed that during the yala seasons, closed spaced crop between rows started withering early due to competition for moisture.

Thus it is concluded that row to row spacing of 60 cm. and plant to plant spacing of 45 cm. with two plants per hill is the optimum plant population to get high yields of chilli.

Table - I.

Effect of Spacing and Plant population on the yield of Chilli variety MI-2.

Spacing		Plant population Per/ha	Yield (kg/ha)			
Between rows (cm).	Within the row (cm)		Maha 86/87	Yala 87	Maha 87/88	Yala 88
30	30	103,200	1515	1409	1333	1324
45	30	69,600	1512	1294	1463	1398
45	45	62,400	1231	1363	1092	1408
60	30	50,600	1128	1038	986	1125
60	45	69,600	1846	1960	1789	2070
60	60	50,600	1567	1220	1412	1320
C V %			15.0	19.1	14.2	16.1
LSD 5%			431	321	249	387



USE OF INDUCED MUTATIONS FOR CROP IMPROVEMENT PROGRAMMES IN SRI LANKA.

Ranjani Peiris* and S.D.G. Jayawardena**.

Introducton:

Induced mutations have been known to scientists since about 1920. However, its use in plant breeding work was made only since 1950. The role of induced mutation in plant breeding has been controvercial subject for many years. Increasing interest in utilizing induce mutations in breeding programmes began from mid 60's. Recent reports indicate that more than 300 improved cultivars of cereals, other grain crops, vegetables, forage crops, fruits and industrial crops and more than 250 ornamentals have been developed in different countries through mutation induction. Some of them are commercially grown while others are used in cross beeding programmes to achieve further crop improvements by recombining desirable traits. The desired characteristics that have been obtained by mutation breeding in agricultural crops are mainly those that have not been favoured by natural selection in evolution or derived in previous plant breeding efforts, but are of value in domesticatedaaa plants. Thus the use of nuclear techniques may have a potential for improvement of crop plants in Sri Lanka.

Use of Radiation induced mutations in Plant Breeding.

The basic requirement in any breeding programme is the clear identification of

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plant breeding objectives. In mutation breeding too, this approach is the same. First, the breeder studies the available genetic resources the nature of inheritance (dominance, recessiveness, genecomplexes etc.) available sources and the efficiency of the selection that could be applied in a breeding programme. After considering the above mentioned factors breeders can decide the breeding method to be adopted such as either by hybridization or inducing mutation.

The most important pre-requisites for a successful breeding programmes s are the effective method of mutagen treatment (physical or chemical mutagens) and appropriate selection procedure. The mutations can be used in plant breeding work in different ways as shown in Table I.

Selfand Cross Fertilizing Species.

It is generally expressed that induced mutations have less scope for the improvement of cross fertilizing species. The problems here arise in selecting, incorporating and maintaining recessive mutation in the population. Heterozygosity is the main constraint in the selection of desirable mutants. Therefore, use of radiation induced mutations are not much accepted by breeders of cross pollinating species. However, by understanding the floral biology (self incompatible, monoecious. dioecious etc.) and method of breeding, new prospects in mutation in breeding of these crops could be estatablished. Induction of male sterility is a useful application of mutagenic agents on these crops.

In self pollinating annual crop plants, mutation breeding is not a problem. Mutation induction and in vitro culture technique offer the same prospects for the both cross and self pollinated crops.

Vegetatively propagated species.

Cross breeding is often limited by specific difficulties (cross barriers, incompatability, sterility) in most vegetatively propagated plants. Plant improvement in these species mainly depend on the selection of naturally occuring mutants (sports). Therefore, the use of radiation induced mutations have a high potential for further genetic improvement in these species.

The main advantage of mutation in vegetatively propagated species is the ability to change one or few characters without disturbing the established genotype. In vegetatively propagated species the most commonly used plant parts are tubers, bulbs, corms, dormanat cutting, stolons and rhizomes (Broertgea 1972). Both chemical and physical mutagens have been used in mutation induction. But it has been reported that the physical mutagens are more effective than chemical mutagens due to limited penetration of chemical mutagens into the plant tissues. For vegetatively propagated species irradiation exposures over long periods of time has no advantage over exposures delivered over a short period.

Special merits and disadvantages of mutation breeding.

Mutation breeding provides a novel approach to plant breeder for raising the productivity of crop plants thus complimenting conventional plant breeding methods. It is very useful to rectify one or two undesirable traits found in a well adapted variety.

A desired mutant can be recovered in a homozygous stage already in M_2 or M_3 as compared with the F_6 F_7 generation in the case of hybridization. Therefore the time required to breed the improved variety can be shorter than when hybridization is used to achieve the same result.

Hybridization is the basic method of creating variability that the breeder needs for his selection. But when genetic variability is limited or lacking, mutation breeding methods are the tools available to the breeder, to create further genetic variability.

The disadvantages of mutation breeding are largely associated with the necessity for testing last second generation (M_2) population. The field work required to achieve some particular improvement is often substantially greater with mutation breeding than the conventional breeding methods. Cell culture techniques may solve the problem in the future. Powerful mutagens are available but the genetic alterations produced cannot be easily detected. Section techniques should be refined to solve this problem..

Conclusion

The use of induced mutations in crop improvement has not been adequately expolited in Sri Lanka. It is very clear that the mutation breeding has greater chances of success when the scientist working in these areas are working hand in hand with conventional breeders. There should be strong linkages with the regional and national breeding programmes.

Mutation breeding could be effectively utilized to create favourable specific changes such as short culms, resistance to lodging, earliness, plant type, resistance to pests and diseases, improvement in grain quality, shattering and shedding resistance etc. in the individuals without altering the total genotype. (Table 2).

In addition to cereal crops, attention should be paid to other various cash crops specially vegetatively propagated species which have enormous potentials for mutation breeding.

Induced mutation connected with in-vitro cultural technique would also be an important aspect in mutation breeding. It would present a wide and bright prospect in near future.

The use of radiation induced mutations is an effective additional tool for plant breeding work in Sri Lanka.

Table - 1. Methods of using mutations in Plant breeding.

I. Use of point mutations

1. Autogamous species:
   - (a) Direct use of mutations: mutants used directly as improved varieties.
   - (b) Cross-breeding with mutations.
     - (i) Crossing the mutants with the original parent variety or line.
     - (ii) Crossing different mutants from the same parent line.
     - (iii) Crossing different mutants from different parent lines.
     - (iv) Crossing the mutant with a different variety or line.
     - (v) Crossing two varieties apparent carrying the same mutant.
2. Allogamous species: induction of mutation to increase variability.
3. Heterosis breeding: induction of mutations in inbred lines. Induction of male sterility (allogamous and autogamous).
4. Asexual plants: induction of "sports"

II. Use of chromosome mutations.

1. Use of translocations: for transferring characters from other species and genera.

2. Use of translocations (with known breakage points) for productions of "directed" duplications.

3. Diploidization of polyploids.

III. Use of mutagenic agents for special breeding problems.

1. Use of radiation to produce haploids.
2. Use of mûtagens to increase or lower the frequency of chiasma.
3. Use of radiation for production of transitory sexuality in apomicts.
4. Use of radiation to reduce incompatibility in wide crosses.
5. Use of induced mutations for special studies of genetics or physiological morphological, and biochemical processes in crop plants.

A MANAGEMENT PACKAGE FOR COWPEA BRUCHID IN GRAIN LEGUMES IN SRI LANKA.

C.M.D. Dharmasena, Research Officer,
Regional Agricultural Research Centre,
Maha Illuppallama.

Cowpea bruchid Callosobruchus maculatus F. (Coleoptera: bruchidae) is a major storage pest in grain legumes. It has been reported that it can destroy the untreated cowpea up to 87% in a period of nine months during storage.

Two Callosobruchus species are found in Sri Lanka. Climatic conditions of the dry zone of Sri Lanka where major grain legume production occur are favourable for their rapid multiplication. C. maculatus could complete the life cycle within a period of 26-28 days under the condition at Maha Illuppallama. It has been reported that it could complete the life cycle within a period of 4-5 weeks. Larval period of C. maculatus decreases with increasing temperature.

There is a general practice among traders to use insecticides liberally to keep the pest under control. Occasionally consumers come across grains of cowpea or greengram emanating smell of insecticides So, there is a need to educate the farmer and the trader to control this pest in Sri Lanka. This paper proposes a pest management package for cowpea bruchid, based on the research findings under Sri Lankan conditions.

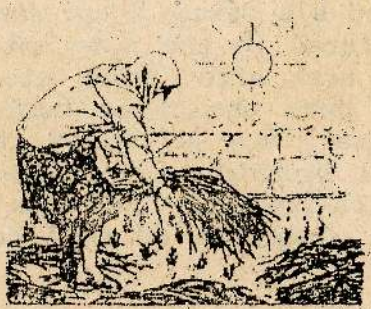
In managing cowpea bruchid, oviposition should be avoided because damage become severe when the infestation is high. Timely harvesting is an easy method in minimizing egg laying in the field. Such unhusked cowpea could be stored for a longer period with lower damage than seeds. Cowpea (cultiver MI - 35) seeds stored in gunny bags for 11 weeks suffered 87% damage (expressed as seed damage) while pods stored in the same material suffered only 46% damage even after being stored for 27 weeks. The stored pods should be husked when they are about to dehusk. Sun drying of those seeds is necessary to kill bruchid eggs. However, over drying beyond 3 days continuously increases ovipositional preference due to roughness of seed coat caused by cracking.

It was also recorded earlier that female bruchid finds it easy to move and lay eggs on greengrass seeds with rough seed coat, as compared to those with shiny seed coat. Applying 5 ml. of mee (Besia longifolia) oil to 1 kg of cowpea seeds lower the ovipositional preference and increase egg mortality. Problem of rancidity does not arise in the case of mee oil. Margosa (Azadirachta indica) oil could be used when seeds are meant for planting. Alternatively 4% paddy husk ash (by weight) can be used. Seeds treated with oil or ash could then be packed in polythene to avoid the infestation and sent to the market. If a farmer wants to store his seeds for a better market, he can do so by storing seeds in barrel-shaped clay "bissa" without significant damage. A layer of powdered leaves of margosa on the seeds helps to bring down the pest population in the "bissa".

Varieties with small seeds and glossy seed coats have been shown to be associated with higher degree of resistance than large seeds with dull surface. Such varieties could be promoted in areas where bruchid infestation is high.

Use of methyl pirimiphos (Actalic) either as 25% solution on to the storage bags containing seeds meant for consumption or 2% dust where seeds are to be used as planting material, is the current method recommended to control this pest. Fumigation by (methyl bromide or phostoxin) could be used in large warehouses.

However, insecticide application is considered as the last resort as it creates other problems like environmental pollution, resistance development in the pest and health hazards.



HUMAN RESOURCE MANAGEMENT FOR AGRICULTURAL DEVELOPMENT

I.M. Gunawardena
Subject Matter Specialist (Communication)

Introduction

We have many personal experiences of having met officials and representatives of various organizations and institutions. Perhaps we have met them in offices or work places. Also we have noted how pleasent (or unpleasent), efficient (or inefficient) and well organized (or disorganized) some of them were. In this modern world we are influenced some how, by management. Management pracatices largely determine the effectiveness, efficiency goal achievement and the capacity for survival of both organizations and individuals.

While management is important to us, Agricultural Development is also one of our priority goals, since while agriculture contributes around 26% to the gross national production it also provides gainful employment to nearly 46% of the total work force. While agricultural productivity can be and must be further increased, it can generate further employment opportunities and therefore it is both timely and relevant to examine the relationship between management of human resources and agricultural development.

Human resource management is concerned with the optimum utilization of people to accomplish the objectives and goals of an organization or institution. Human resource management begins with human resource planning.

Human resource planning (HRP)

Human resource planning is an indispensable activity that makes it possible for an organization to have the right number and kinds of people in the right places at the right time, engaged in performing those tasks that enable achievement of an oganizations objectives. HRP is useful to determine the present and future human resource requirement and develop plans to meet them. Therefore

HRP may be dsefined as a strategy for requisition, utilization, improvement and retention of human resources needed for an organization. Thus HRP encompasses development of a man power policy including recruitment, orientation, induction, deployment, development and retention.

A human resource plan of an organization is thus a part of an organizations resource plan. Human resource planning enables assessment of human resource requirement and evaluation of current peformances of individuals and predict their potentials. Thus to provide for career management or charting; provide systems, forms, guides and charts for marking job requirements with skills Presently possessed. Thus encompasses several concerns - cost, morale, leadership, productivity, compensation, improvement and conservation of this vital resource. HRP indicates the total human input required by the organization and assures a pre-determined return for the cost incurred.

Approach used in HRP

The organization should be concerned with

1. The human resources needed to work in each operating unit of the organization to meet its production or servicing targets, growth, progress and development. (Planning for effective and economical use of human resources, facilities goal achievcement).

2. All inventory of available human resource supply within and outside the organization to ensure upgrading or improvement of available resources, in a timely manner.

3. Identify gaps that exist at present or may emerge in the future due to retirement, etc. Match human resource needs with supply within the organization to avoid disruptions and delays.

4. Plan, prepare and implement programmes to improve productivity, and ensure growth development of critical categories of employees.

5. Provide systems and procedures that will maximise the utilization of human time and potential.

6. Provide a congenial atmosphere that stimulates peak performance and also attract and retain efficient and productive people.

Objective of HRP

Human resource planning aims to determine and make ready the gross man power needs of the organization in terms of the standards of talents and skills required as well as excellence. The specific goals of human resource planning are :-

(1) To set goals and standards of performance to ensure effective and efficient goal achievement.

(2) To train and prepare trained manpower for replacing those who leave the organization due to old age, disability etc.

(3) To develop training and motivational activities to provide the skills and knowledsge and boost morale, to facilitate achievement of organizational goals.

(4) To evaluate and or assess job performance of employees. In some organizations job performance reviews are conducted for 95 percent of all jobs. Some organizations ensure that job performance review and an interview with their superiors at least once a year.

(5) To implement a programme of job enrichment so that the good and the best workers remain with the organization instead of moving away to other orgenizations.

(6) To ensure training opportunities to those in need of training. (Example, training superiors to improve leadership skills etc.)

(7) To measure and device means of improving performance levels. (Performance evaluation can be undertaken at the end of a cultivation season or year).

(8) To develop a suitable communication and staff development programme to enable the organization to work as a united, purposeful team.

Stages of Human Resource Planning

A human resource plan deals with an anticipated future situation (immediate or long-run). Forecasting is therefore an essential component of human resource plan formulation.

There are six stages involved in HRP. They are -

(a) Analysis of the current human resource situation.

(b) Forcasting human resource requirement (at least on an annual basis)

(c) Forcasting human resource supply.

(d) Reconciling human resource requirement and supply forecasts.

(e) Operationalisation (action process) and monitoring.

(f) Assessment, evaluation and replanning.

An analysis of the current human resource situation yields data on -

- human resource position of the organization in relation to the systems environment, the national economy and labour market.

It is worthwhile asking a few questions here

- where are we (with respect to the human resource guide posts) now ?
- Are we reaching closer to where we want to go ?
- Are there difficulties or problems in achieving objections ?
- What specific human resource problems need to be surfaced from an assessment of present condition in the light of desired desired goals? (A clear understanding of these goals is fundamental in the planning process).

INSECTICIDE USAGE IN MAHAWELI 'H' AREA AND RAJANGANAYA FOR THE PESTS OF RICE

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A survey was conducted during 1987/88 Maha season in Mahaweli 'H' area and Rajanganaya (right bank) to study the insecticide usage for rice pests to find whether insecticide use benefits the farmers. The entire study area comes under major irrigation projects. Most of the farmers are settlers from various parts of the country. Farmers in Rajanganaya came in 1950's whereas farmers in Mahaweli 'H' area were settled in mid 1970's.

Methodology

Two to five farmers were selected from each track at Rajanganaya and each Mahaveli village. A questionnaire was used to record information at the end of the interview.

Results

Number of insecticide applications per season for pest control in rice was very high in Rajanganaya compared to 'H' area (Table 1).

Table 1. Number of insecticide application per season for the pests of rice (1987/88 Maha).

No. of insecticide applications	Percentage of farmers reporting	
	Mahaweli 'H' area	Rajanganaya (right bank)
0-2	83	43
3-4	17	51
5-7	-	06

The reason for several application of insecticides at Rajangana may be due to the widespread damage from gall midge, during that season. The majority (90%) of the farmers at Rajanganaya reported the major rice pest as gall midge while only 58% of farmers from 'H' area reported so. (Table 2).

Table 2. Most important pest of rice during 1987/88 Maha season.

Pest	Percentage of farmers reporting	
	'H' area	Rajanganaya
Gall midge	58	90
Rice thrips	20	05
Leaf roller	16	05
Plant hopper	04	-
Stem borer	02	-

The amount of insecticide solution sprayed per per hectare was very low in Rajanganaya area compared to the recommended quantity of 450 l/ha. However, Mahaveli farmers were a little better in this respect and 5% of the farmers from 'H' area reported that they applied the recommnded quality (Table 3).

Table 3: Amount of insecticide solution sprayed per hactare.

Liters applied per hectare.	Percentage of farmers reporting	
	'H' Area	Rajanganaya
0-75	02	25
76-150	32	35
151-225	24	19
226-300	32	19
301-375	05	02
376-450	05	0

The majority (62%) of the farmers in Mahaveli 'H' area select insecticide by experience while 32% in Rajanganaya do the same. (Table 4) The farmers think that they have a very good knowledge of the effectiveness of insecticides which may not be correct all the time.

Table 4: The basis for selection of insecticides and the source of information.

Source of Information.	Percent farmers reporting	
	'H' area	Rajanganaya
Field officers	25	30
Pesticide dealers	02	10
Mass media	0	0
Neighbouring farmer	11	28
By experience	62	32

Most of the farmers in both areas have used mono-crotophos. They had not paid much attention to apply the recommended insecticide (Table 5).

The farmers pay very little attention to apply the recommended dosage of insecticide. On cut of 110 farmers had applied the recommended doseage to control Gall midge through it was the major problem in botah areas. Most farmers use a small bottle to measure insecticide. Their second choice is the lid of the insecticide bottle. Some farmers do not use any such device. But they roughly measure as parts of the insecticide bottle. Nearly 40% of the farmers in both areas use 16-30 ml.of insecticide per tank. However, the concentration used by farmers in 'H' area is comparatively higher than that of Rajanganaya.

Table 5:

Insecticides applied for controlling major pests in rice.

Insecticide used.	Location					
	'H' Area			Rajanganaya		
Carbofuran	G.M. 31*	thrips -	L.F. -	G.M. 16*	thrips -	L.F. -
Fenthion	13	9*	-	02	14*	-
Monocrotophos	33	73	78*	65	57	3[illegible]*
Methomidiphos	10	9	11	06	-	17
Anthio	-	-	11	-	-	-
Malethion	05	9	-	3	14	17
Quiniliphos	05	-	-	-	-	-
Omethoate	03	-	-	-	-	17
Chloropyritos	-	-	-	6	-	17*
Fenvilarete	-	-	-	-	14	-

* Recommended insecticide. G.M.= Gallmidge

L.F = Leaf folder

Table 6:

Dilution rate of the spray mixture used

Amount mixed ml./10 l.	Percentage of farmers reporting.	
	'H' area.	Rajanganaya
0-15	21	14
16-30	40	41
31-45	16	31
46-60	18	14
61-75	05	-

Discussion

The results show that most of the farmers use highly toxic broad spectrum insecticides, such as monocrotophos to control pests of rice in their fields. They have not paid much attention to use the recommended insecticides. To control gallmidge only 31% of the farmers at Mahaveli 'H' area and 16% from Rajangana area had used the recommended insecticide, Carbofuran.

Even distribution of small droplets of the insecticide solution all over the canopy minimizes the pest damage effectively. Results show that 60% of farmers at Rajanganaya use less than 150 liters of spray mixture per hectare. This amount is only 1/3 of the recommended amount. Low amount of pesticide solution applied to the upper portion of the crop canopy tends to reduce the natural enemy population rather than the pests. Predetors like draggon fly, damsel fly, spiders and lady bird beetles moving around in the upper portion of the crop canopy are likely to suffer more from such an application rather than rice pests; since most rice pests are found near the rice stems.

some of the farmers in both areas apply the correct concentration to control their pests. But 5% of them in 'H' area apply higher concentrations.

Seventy eight percent of the farmers in 'H' area apply the recommended insecticide; for example monocrotophos to control leaf folders in the rice crop. They apply this mostly because they are familiar with this insecticide. Less than 33% of the farmers had applied recommended insecticides to control the other pests of rice (Table 5). But the greater number of them had reported that they select insecticides through experience (Table 4). This indicate that they have not selected the best insecticides. Their general feeling is that they should spray a less toxic insecticides to the seedlings and gradually go for more toxic ones. This is not correct. Insecticides should basically be selected by the feeding behaviour of the post concerned. Apart from that- type of crop and the climatic factors are also important.

Only three out of 110 farmers had an idea about threshold values. This implies that most of them apply insecticides when they are not really necessary.

Results shows that farmers both at 'M' area and Rajangana area had not used insecticides systematically. The major mistake is that they have not used the correct spray solution. Second important point is that they have not selected the recommended insecticide. Third and the most important point is that they have not considered the threshold levels in decision making. It is obvious that the farmers should be trained properly to systematically use insecticides.

DISCUSSION :

1. **Display instructional leaflets in retail shops**

Exhibition of leaflets containing insecticide recommendations in retail shops, would be useful because farmers usually consult pesticide dealers in selecting pesticides. By providing information to farmers they can get aquainted with the right type of insecticide and the correct dosage for their use.

2. Education (about insecticide) in schools

Teaching the fundamentals of insecticide use to school children can be effected by including such information in compulsory syllabuses like science and Health Education. This will be very important in an Agricultural country like Sri Lanka, where pesticides are used at high rates. It has been reported that the number of accidents due to insecticides is also very high in Sri Lanka.

3. **Farmer Training**

More than 60% of the farmers select insecticides through personal experience or through the experience of neighbouring farmers. So, it is very important to educate farmers directly through farmer training classes regarding important aspects of insecticide usage namely effectiveness, safety and avoidance of environmental pollution.

4. **Subsidise insecticides used for rice pests**

There should be a subsidy scheme or a loan scheme for the needy farmers to buy the recommended insecticides since some farmers cannot afford to buy insecticides due to financial difficulties.

Instructions to Contributors

General - Papers to be published in Krushi should be submitted to the Editor, Krushi, P.O.Box 10, Peradeniya.

Manuscript

- Papers should be typed, double spaced. The original and two copies should be submitted. The paper should consist of an introduction, materials and methods results and discussion whenever possible. Short communications are accepted if they are relevant to agriculture or the process of agricultural development in Sri Lanka.

Tables - Should be numbered and bear an appropriate title.

Figures - All diagrams and figures including lettering should be drawn in indian ink on white or tracing paper. The title and legend for figures should be given on a separate sheet. Please make lettering and drawings proportionate to reduce size (if required) for printing.

Summary - The summary of the paper should be placed at the beginning of the paper and suitable for use in abstracting journals.

References

- Arrange alphabetically. Each references should have author(s) name with initials after surname, year of publication in Parenthesis with the title of article, volume and page.

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