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FARMER MANAGEMENT PRACTICES ON THE PRODUCTIVITY OF BIGONION CULTIVATION IN THE DRY ZONE OF SRI LANKA

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ABSTRACT

Department of Agriculture has recommended high yielding big onion varieties of good quality with suitable agronomic packages for the dry zone. However, farmers complain that they obtain low yields and had to bear high cost for onion production. A field survey was conducted with 75 farmers in major big onion growing areas in the dry zone to study this situation. Planting of selected and treated seedlings at mid May- mid June is the best period for a higher standard crop. Fifty percent of farmers deviated from correct time of planting, selection of seedlings and 17% did not follow any seed or seedling treatment. Use of recommended chemicals and rates at correct time effectively control the pest and diseases. Seventy percent of farmers used chemicals, which are not recommended at high frequency and 35% did not follow proper weed controlling methods resulting increased cost of production. Though an economical yield increase was not observed with increasing fertilizer rates, 85% of farmers applied different inorganic fertilizers exceeding the recommended level. Many farmers did not adopt organic manuring for soil improvement. Nobody followed any curing practice required for the quality of bulbs. Deviation from recommended crop management practices caused an increased cost of production with low yields (<8 t/ha) and quality.

KEY WORDS: Big Onion, Farmer Manag nent, Productivity

INTRODUCTION

Big onion is an important spice in any Sri Lankan diet mainly used for seasoning dishes or it can be consumed either fresh or cooked. Commercial cultivation of big onion in Sri Lanka was started in early 1970's. Since then the cultivated extent has increased but some fluctuations were observed on market price during past few decades. However, the present average cultivated extent is around 3,000 ha. The annual requirement is yet to be fulfilled by the imported onion (110,000 t) by spending Rs.1,750 millions annually (Department of Census and Statistics, 2001). Department of Agriculture (DOA) has recommended high yielding varieties (>25t/ha) that are adaptable to local environment along with suitable agronomic practices. However, farmers complain that they obtain low yields with high cost of production leading to lower profit margin. Therefore, the aim of the present study was to identify the reasons causing yield reductions and high cost of production in big onion cultivation.

MATERIALS AND METHODS

A survey was conducted in *yala* 2000 seasons with 75 onion farmers in the Dambulla, Galewela, Dewahuwa and Sigiriya Agriculture Instructors divisions in the dry zone, where mainly big onion is cultivated extensively.

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Farmers were selected with the help of Agriculture Instructors and directly contacted through the village headman. The information was collected by interviewing farmers and inspecting their fields once a week by a team of officers. Information related to planting materials, cropping system, time of planting, nursery management, pest and disease control, weed control, fertilizer management and usage of labor for each activity were recorded using a structural questionnaire from the beginning to end of the crop. In addition to that yields were measured by crop cuttings.

RESULTS AND DISCUSSION

Source of seeds

Field Crops Research and Development Institute has developed a package for true seed production and proved that yields could be effectively increased by using local seeds. Sri Lankan farmers fail to produce required amount of good quality seedlings with high yields from their nurseries (Table 1) because of the fact that they always depend on imported seeds. This fact was proved in some other countries too. According to Rahim and Siddique (1991), a huge quantity of seeds comes to Bangladesh through Indian border. These seeds are of poor quality and infected with diseases. Mixing of these seeds which are of different age groups would result in very unsuccessful big onion cultivation.

Table 1. Effect of seed source on yield

Seed Source	*Area Covered*	*Yield (t/ha)*
Market seeds	94	11,000
Locally produced seeds	6	14,500

Cropping systems adopted by farmers

The Big onion cultivated lands are utilized both in *yala* and *maha* seasons. Therefore, in the absence of soil improvement programs, it is obvious that the crop yields would decline. Farmers follow different types of cropping patterns (Table 2). Eight percent of farmers cultivate onion in lands, which are kept fallow in *maha* season. The yields of these lands are comparatively higher than that of others due to the improvement of soils during fallowing period.

Table 2. Cropping systems adopted by farmers

Cropping system	*Adoption Rate (%)*
Paddy – onion	59
Chilli – onion	11
Vegetable – onion	22
Fallow - onion	8

Varieties cultivated

In spite of the recommended varieties having high yields, 93% of farmers cultivated only the variety *Rampure* and 7% *Dambulu red.* At the planting time, only a few onion varieties (*Rampure* and *Nasic red, etc.*) are in the market. Farmers used to purchase seeds whatever available in the market during this period mostly under the direction of the merchants. *Dambulu red* is a cultivar selected from *Pusa red*, maintained by few farmers. Therefore, the availability of this variety is very limited.

Seed rate used for nursery

Though the recommended seed rate is 6.5-8.5 kg/ha, farmers used higher rates to get required number of seedlings. Main reason for this is that they have a doubt about the germination capacity of market seeds. However, farmers who use *Dambulu Red* do not use higher seed rates because those seeds are locally produced seeds with assured germination. About 25 % of the farmers used lower rates than the recommended rate and over 30% used almost double the recommendation due to germination experience gained from market seeds (Table 3).

Table 3. Seed rates used by farmers

Seed Rate (kg/h)	*Farmer Adoption (%)*
< 6	25
6.5 – 8.5	42
9 - 11	33

Time of planting

Onion is a long day plant and it requires dry period for a successful crop. Considering climatic and weather conditions and pest and disease problems, mid March- mid June is the best planting time to obtain high quality bulbs and good yields. Fifty percent of farmers planted during the recommended period. Forty five percent of farmers delayed planting and 3% planted early (Table 4). Farmers who deviated from the recommended planting time obtained low yields.

Table 4. Time of crop establishment

Time	*Mid April-Mid May*	*Mid May- Mid June*	*Mid June-Mid July*
Farmers (%)	3	52	45
Yield (kg/ha)	12,500	14,000	9,500

Nursery management practices

Most of the diseases could be transmitted by seed materials. Pedro (1996) reported that Anthracnose as a seed borne pathogen in more than 50% of the onion seed samples analyzed. Therefore, seed treatment is essential to maintain the crop in higher standard especially when the source of seeds is

unknown. Burning of nursery beds prior to seed application by using straw and husks or using chemicals help to sterilize the nurseries. Only 25% of the farmers have followed both above methods (Table 5). More than 17% did not use any sterilizing method. Therefore, most of their nurseries were affected with diseases since the initial stages.

Table 5: Sterilization methods used for nursery

Practice	*Farmer Adoption (%)*
Burning Only	22.5
Seed Treatment(ST) Only	35
Burning+ST	25
Untreated	17.5

Use of quality seedlings for planting and plant spacing

Seedlings prepared for planting are recommended to dip for 20-30 minutes in a fungicide solution prior to planting to minimize diseases. But about 17% of the farmers have not practiced any kind of treatment method. Seedling size in terms of leaf numbers, leaf area and total weight at transplanting has a marked effect on the on set time of bulbing, bulb quality and yield (Mettananda and Fordham, 1999). However, nobody followed the DOA seedling selection criteria because of the poor knowledge on selection and belief that the selection is wastage of seedlings. Number of good bulbs per unit area becomes low when seedlings are not properly selected. In addition, they have used different spacing. Maintaining plant density at 100 plants/m^2 or 156 plants/m^2 is the best for optimum bulb size and yield. Fifty percent of farmers have followed recommended spacing and the rest used higher plant densities while few have used very high plant densities like 400 plants/m^2 resulting a low marketable yield (Figure 1).

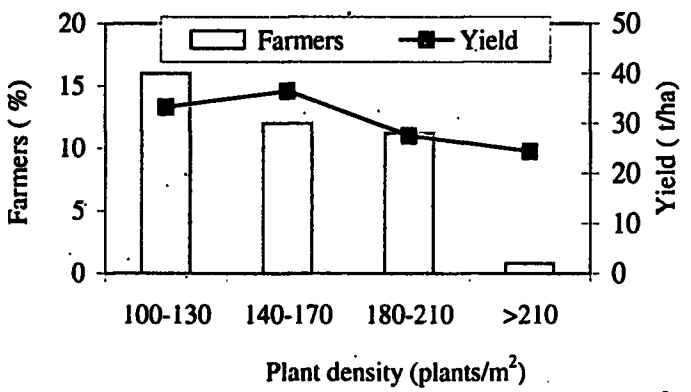

Figure 1. Plant densities used by farmers and onion yields

Application of inorganic and organic fertilizer

Basal dressing (30 kg N, 45 kgP_2O_5, and 30 kg K_2O) with two top dressings, one at 3wap (30kg N) and the other at 6wap (30kg N and 15 K_2O kg) were recommended for the B'onion crop in addition to the organic manure at the rate of 10 t/ha. Only 15% of the farmers have applied organic manure at the rate of 2-6 t/ha. Application of different types of fertilizers in the basal and top dressings (Table 6) resulted an imbalanced nutrient supply. Eighty five percent applied more than the recommendation. Forty-five of them have applied three times the recommendation but there was no yield increase with the inorganic fertilizer (Figure 2). Dharmasena (1998) has shown that although the farmers apply more than the recommended quantity of fertilizers, the yield did not increase. Farmers who applied even less amount of organic manure received higher yield compared to others. In addition, they have applied more than two splits (4-5) even 6 weeks after planting. Application of additional fertilizer amounts and splits did not affect the yield but the storability. Though farmers were asked to apply direct fertilizers, only few of them had practiced. Some of them did not apply basal at planting. They have applied liquid fertilizers in addition to the straight fertilizers. This type of fertilizer usage is not economical to the farmer and harmful to the environment.

Table 6. Types of fertilizer used in basal and top dressings

Types	*Farmers (%)*	
	Basal Dressing	*Top Dressing*
V. mixture	87.5	-
Onion mixture only	5	7.5
Straight fertilizer	7.5	-
Urea only	-	42.5
Urea + TDM	-	20
Urea + MOP	-	7.5
Urea + Onion mix.	-	15
Urea + Onion mix. + TDM	-	7.5

TDM=Top Dressing Mixture, MOP= Mureate Of Potash

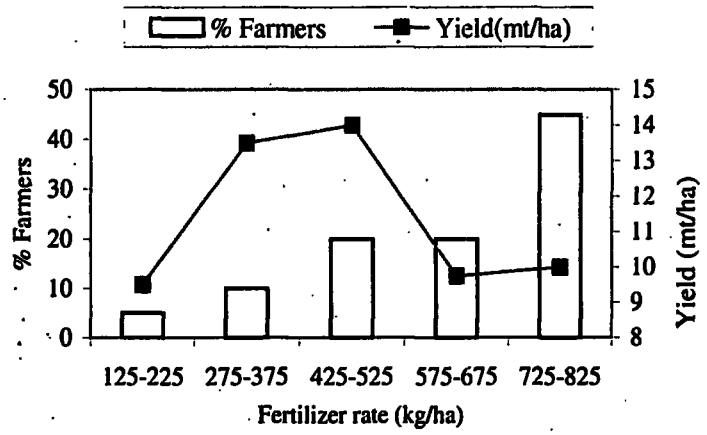

Figure 2. Different fertilizer rates used by farmers and their yields

Pest and disease control

Major insect pest problem in *yala* season is thrips (*Thrips tabaci*) and there are recommended chemicals (Fipronil, Imidacloprid, and Carbaryl) methods and time of application to control the pest. Some foliar diseases (downy mildew, basal rot, *etc*) were controlled by applying different chemicals which are not recommended. Therefore, a proper pest and disease control was not observed. Only 30% of the farmers applied recommended chemicals. The major reason for this was that all the advice for chemicals were obtained from the nearest chemical traders. Most of the farmers used to apply chemicals within 2-3 days expecting sudden results. When the application frequency was very high the cost of pest control became high without any benefit.

Weed control

Basic chemical weed control, which is practiced prior to land preparation and application of pre-emergence weedicides just after field establishments followed by 1-2 hand weeding effectively control all kinds of weeds with less weeding cost. However, 35% had not used any primary weed control method (Table 4). Almost all have used only pre-emergence weedicides followed by hand weeding. Specially, perennial weed control is difficult with these practices. Therefore, farmers had spent more labour for hand weeding resulting an increased cost for weeding operations.

Table 7. Methods of weed control

Chemical	*No Chemical*	*Round Up*	*Alachlor (Ala)*	*Oxyflurofen (Oxy)*	*Oxy+Ala*	*Hand Weeding*
Before planting	35%	48%	18%			
After Planting				27%	73%	100%

Water management

Each farmer has pumped water either from an agro-well or from a canal. Most of the time they used flood irrigation method and mostly over irrigated their fields. Fifteen percent of farmers irrigated at 2-3 day intervals. Farmers need to change the irrigation interval according to the soil condition. Higher irrigation frequency and over irrigation always increase the cost. Many farmers attended to irrigation but not to drainage. Poor drainage would cause disease development resulting low yields and high cost of production.

Cost of production

One kilogram of onion can be produced at the cost of Rs. 8-9 if the DOA recommendations are adopted. However, farmers have increased their cost of production by attending unnecessary practices. Observations showed that the cost of cultivation varied from Rs. 93,000 - 165,000/ha including family labour. Out of that highest total cost was recorded for weed control (18%) followed by land preparation (15%), nursery management (15%), harvesting (15%), irrigation, pest control, fertilizers and seed materials (Table 8). Extreme deviations from the recommendations have caused high cost of production. If they follow the recommendations they could be able to maximize the yield with a low level of cost of production to get a higher profit margin.

Table 8Cost of cultivation for different cultural practices

Cultural Practice	*Cost of Cultivation as a % of the total cost*
Seed material	10
Nursery management	10
Land preparation	15
Fertilizer	8
Weed control	15
Pest control	15
Irrigation	5
Harvesting	13

CONCLUSIONS

Use of locally produced true seeds could effectively increase the big onion yield. Use of higher fertilizer rates and different types of fertilizers did not influence the yields. Knowledge of the farmers about the DOA recommendations is poor. Farmer practices deviated from the DOA recommendations resulting low productivity and high cost of production.

REFERENCES

Department of Census and Statistics. 2001. Report Department of Census and Statistics, Sri Lanka.

Dharmasena, P.B.1998. Is agro well farming in Anuradhapura district profitable. *Technical news letter*. Publication of the Department of Agriculture, Peradeniya, Ministry of Agriculture and Lands.

Mettananda,.K.A. and R Fordham. 1999. The effects of plant size and leaf number on the bulbing of tropical short- day onion cultivars (*Allium cepa* L.) under controlled environments in the United Kingdom and tropical field condition in Sri Lanka. *Journal of Horticultural science and biotechnology* 74 5: 622-631.

Pedro, B. 1996. Seed infection by *Collectotrichum gloeosporides F.sp cepae* is the main cause of recent onion bulb rot in South Brazil. *Onion news letter for the tropics,* 7: 16-17

Rahim, M.A. and M.A. Siddique. 1991. Onion seed production situation in Bangladesh Problems, prospects and research. *Onion news letter for the tropics, 3.*