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Factors responsible for productivity of food legumes: Findings of a farmer survey in the Kurunegala district, Sri Lanka

Short communication

M.P. Hettiarachchi[1]*, W.A.J.M. De Costa[1]** and S.J.B.A. Jayasekera[2]
[1]Department of Crop Science, Faculty of Agriculture, University of Peradeniya, Sri Lanka.
[2]Department of Horticulture, Wayamba Campus, Rajarata University of Sri Lanka, Makandura, Sri Lanka.

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ABSTRACT

Food legumes are an important component in upland cropping systems of subsistence farmers in Sri Lanka. The objective of this study was to understand the factors responsible for the gap between potential yield and farmer yield in Kurunegala district. Results revealed that information on improved varieties of cowpea (*Vigna unguiculata* (L.) Walp), greengram (*Vigna radiata* (L.) Wilczek) and groundnut (*Arachis hypogaea* L.) and on better management practices have not reached the farmers.

Key words: Food legumes, productivity, Sri Lanka, yield.

Food legumes are an alternative source of protein for the majority of the population in Sri Lanka (Gunasena and Herath 1987). In 1995, cowpea (*Vigna unguiculata* (L.) Walp), greengram (*Vigna radiata* (L.) Wilczek), soybean (*Glycine max* (L.) Merril), groundnut (*Arachis hypogaea* L.) and common bean (*Phaseolus vulgaris* L.) were cultivated in an area of 60,902 ha to produce 79,475 mt of yield (Anon. 1995a). In Sri Lanka, Kurunegala (longitude - 80° 30'E, latitude - 70°30'N, mean annual rainfall 1800mm, mean temperature 30°C, soil- Reddish Brown Earth (Rhodustalfs), Low Humic Gley (Tropaqualfs) and Non Calcic Brown (Haplustalfs) is one of the major legume growing districts, especially of greengram (24.5%), cowpea (21.3%) and groundnut (12%) (Anon. 1995b).

The average yields of greengram (0.35 t ha^{-1}), cowpea (0.32 t ha^{-1}) and groundnut (0.55 t ha^{-1}) obtained by farmers in Kurunegala district are much lower than the potential yields (greengram- 0.88 t ha^{-1}, cowpea- 0.82 t ha^{-1} & groundnut- 0.97 t ha^{-1}) obtainable from farmer fields (Jayasekera and Hettiarachchi 1987; Jayasekera and Ariyaratne 1988). The objective of the present paper is to provide specific information on cowpea, greengram and groundnut production in Kurunegala district and to highlight problems and constraints of legume cultivation from the farmer's viewpoint.

One hundred farmers were selected using the stratified random sampling technique. Farmers were selected in the survey to represent the larger legume growing villages: Yakadapotha, Meegallewa, Paluwaduressa, Mahagirilla, Udagirilla, Waduressa and Madapotha in the Kotawehera range and Palliyakale, Boraluwewa, Udawewa, Korakahawetiya and Hirigolla in the Kobeigane range. A structured questionnaire was used to collect cultivation information on greengram, cowpea and groundnut from farmers in the selected areas.

Extent and purpose of legume cultivation in the survey areas

In the Kotawehera area, all the surveyed farm families cultivated greengram and cowpea during southwest monsoon (May - July) and northeast monsoon (October -January) seasons in the uplands. Groundnut was cultivated only during southwest monsoon by 80% of the farmers surveyed. In Kobeigane, only 50% of the farmers surveyed cultivated legumes. In this area, cultivation was confined to lowlands during southwest monsoon because there was not enough irrigation water to grow a rice crop. Here, the uplands were not used for legume cultivation because of lack of irrigation facilities.

***Present address**: Department of Crop Science, Faculty of Agriculture, University of Ruhuna, Kamburupitiya, Sri Lanka.
****Corresponding author**

Cultivated varieties and sources of seeds

Table 1 shows that in all three species of legumes, a majority of farmers surveyed still cultivate the older varieties and the adoption of recently-released varieties is low. Local varieties of greengram are known among the farmers as *Pinna mung* and *Alu mung* whereas *MI 5* is also known as *Tel mung*. Among the cowpea varieties, Arlington is cultivated during both seasons whereas MI 35, *Vijaya* and *Varuni* are cultivated only during the southwest monsoon season. The survey also revealed that the majority of farmers used their own seeds (Table 1) because they were confident about the seed viability. As a result of the continued use over several seasons (Table 2), the genetic purity of many varieties have been significantly reduced and often the improved varieties are mixed with local varieties. Even when the farmers purchase their seeds, only a minority uses the sales centres of the Department of Agriculture (DOA).

Table 1. Cultivated varieties, sources of seeds and some cultural practices of three selected legumes in Kurunegala district, Sri Lanka.

Factor	Percentage of farmer surveyed		
Varieties grown	Greengram	Cowpea	Groundnut
Old varieties	Local varieties - 50	Arlington - 100	Red spanish
New varieties	MI 5 - 75	MI 35 - 50	& V87 - 100
	Harsha - 15	Vijaya & Varuni - 25	Tissa & Walawe - 20
Sources of seeds			
Own seeds used	80[a]	80	90
DOA[b] sales	30	20	10
Private traders	70	80	90
Sowing -2 seeds/hill	100	50	100
-3 seeds/hill	-	50	-
Fertilizer application			
Northeast monsoon season	85	70	-
Southwest monsoon season	40	10	20
Crop duration	2-3 months - 40 3-3 1/2 months - 60	3 months - 100	3-3 1/2 months - 100
Harvesting	One pick - 10 3-4 picks - 70 7-8 picks - 20	3-4 picks - 60 5-6 picks - 40	One pick - 100

[b]DOA - Department of Agriculture, Sri Lanka
[a]Farmers use seeds from all sources in same season.

Cultural practices

Table 1 shows some of the key cultural practices and the percentages of surveyed farmers who use them. Farmers predominantly used two seeds per hill during sowing. Although it was advantageous to use more than two seeds per hill to ensure adequate crop establishment under adverse soil conditions, higher seed cost, prevented the farmers from using a high seed rate. Fertilizer rates applied were generally higher during the northeast monsoon season. The greater probability of success of the northeast monsoon crop encouraged the farmers to use more inputs. Frequent failures of southwest monsoon crop, mainly due to drought, discouraged farmer investment in costly inputs such as fertilizer.

Among species surveyed, greengram had varieties with a wider range of maturity. This was a favourable characteristic in this environment where drought is a major cause of crop failure. Both greengram and cowpea allowed several picks of harvest. This trait also added flexibility to the crop by allowing an early harvest before an environmental stress sets in or allowing recovery of yield following a stress period. Both the above characters were major reasons for higher farmer preference for greengram and cowpea in the Kurunegala district.

Pest and disease problems

In both the areas surveyed, legume yields were severely reduced due to pest and disease infestation. The most common pests and diseases in the selected legumes are *Maruca testulalis* and *Lampedes boeticus* (80%), *Ophiomyia phaseoli* (60%), *Callosobruchus chinensis* (60%), *Aphis sp.* & Thrips (40%), Rodents (40%), Yellow Mosaic Virus (70%), fungal diseases (50%) and Wilt (25%). Only 30% of the surveyed farmers applied commercial fungicides to their crops whereas 20% applied sulphur as a treatment. On the other hand, of the farmers surveyed 40% used pesticides. This also highlighted the reluctance of the farmers to invest in a greater level of inputs. A majority of farmers felt that pesticide application was not economical because of marginal increase in yield. Another reason for the low use of pesticides was their non-availability at the required times.

More than 40% of farmers who used pesticides did not know the names of pesticides used and very often a chemical for a given pest or disease was recommended to them by the trader from whom it was bought.

Yields and selling prices

According to the farmers surveyed, only greengram and cowpea gave appreciable yields whereas the groundnut yields were minimal. Greengram and cowpea yields of all farmers surveyed (Table 1) were lower than the potential yield of the varieties (1600 & 1800 kg/ha respectively-Department of Census & Statistics). Only 30% and 20% of the surveyed farmers obtained yields greater than 500 kg/ha for greengram and cowpea respectively.

The selling price was dependent on the specific varietal characteristics. For example, the smaller

Table 2. Farmers' perception of factors responsible for low yields, period of cultivating the same variety and awareness of new varieties of selected legumes in Kurunegala district, Sri Lanka.

Factors	Percentage of farmers surveyed
Reasons for low yoeld	
Drought	100
Water-logging due to high rainfall(in northeast monsoon)	30
Not using newly-released high- yielding varieties	80
Crop damage due to rabbits, wild boars, rats and cattle	60
Low soil fertility	50
Lack of fertilizer application	50
Increased pest and disease problems due to delayed and staggered cultivation	30
Low levels of input use and crop management due to financial constraints	80
Periods of cultivations of same variety	
2-3 years	40
5-6 years	20
13-14 years	20
20-25 years	20
Awareness of new varieties	
Greengram	30
Cowpea	20
Groundnut	10

seeds of the new greengram variety *Harsha* fetched a lower price in Kurunegala district whereas *MI 5* always fetched a higher price. Hence, even the farmers who knew about *Harsha* did not want to grow it because of the ensuing selling problems.

Factors responsible for low yields

Table 2 lists the factors responsible for low legume yields as perceived by the surveyed farmers. Drought and low levels of input use and crop management were identified by a majority of surveyed farmers as factors causing low yields. Among the inputs, failure to use newly-released high-yielding varieties was perceived as a major factor causing low yields. Out of the surveyed farmers, 70%, 80% and 90% mentioned that they did not receive information on newly-released varieties of greengram, cowpea and groundnut respectively. Specifically, only 15% knew about *Harsha*, the newly-introduced greengram variety and this was only through the Upland Development Project conducted through the North-Central Provincial Council. The new cowpea varieties *Vijaya* and *Varuni* were known to only 25% of the surveyed farmers which was also through the above project.

Outlook for the future

In spite of the low yields and constraints described above, all (*i.e.* 100%) the interviewed farmers preferred to continue cultivation of legumes because of several reasons: (a) Legumes need a lower level of inputs and crop management as compared to other high-value upland cash crops such as chilli or onions; (b) Water requirement of legumes is lower than for alternative upland crops; (c) Legumes can be used either for selling or domestic consumption as a major food item in the daily diet, unlike crops such as chilli or onions. On the whole, the farmers felt that under the prevailing environmental and socio-economic conditions in the region, there was no choice but to cultivate legumes as their major upland annual crop.

The present study identified the salient features of legume cultivation and highlighted the factors responsible for lower farmer yields of greengram, cowpea and groundnut in the Kurunegala district. Although the survey was done within a limited area of the Kurunegala district, the agro-climatic and socio-economic environment that prevailed in the survey area was representative of many of the legume-growing areas in the rainfed dry and intermediate zones of Sri Lanka (Herath and Suraweera 1987).

One finding of the survey was the lack of flow of information about newly-released improved legume varieties to the farmers who continue to grow local varieties of low purity which are mostly produced by them. This would mean that all the research effort in producing new legume varieties would be wasted. This gap in the flow of information about new technology has to be addressed as quickly as possible by strengthening the extension service and its linkages with the research centres and the farmers.

It was also revealed that in addition to the lack of knowledge about new varieties, there were no channels through which farmers could get precise information about correct cultural practices and pest and disease control. Both extension services and infra-structure services such as sales centres for seeds and other inputs need to be improved to uplift the general level of productivity and farmer income in legume cultivation. This would help to break the dependence of most of these farmers on private traders to whom the farmers are bound to sell their produce at lower prices. In addition to the extension services, farmer training and education should be strengthened to make the farmers aware of the changing market trends and how best to adjust to them in order to maximize their profit.

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