

An integrated approach towards productivity improvement in black pepper: Sri Lankan experiences

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Abstract

Expansion of new pepper cultivations was the objective of Department of Export Agriculture after it was established in 1972. Pepper was promoted as a mono-crop and an intercrop with major plantation crops such as tea and coconut. The main motivational tool used was subsidies, which were released step-wise manner after fulfilling given cultivation tasks. In the mid 90s fertilizer promotion program was initiated to popularize fertilizer usage.

Integrated nutrient management program was the focus of pepper development during 20s decade. Organic manure production program, integrated fertility management demonstration program and Productivity Improvement Program (PIP) are examples for such programs. In the organic manure production program, Rs. 200 was paid for the 50 feet³ produced; four such units are required for one acre cultivation. To establish one acre integrated fertility management demonstration plot Rs. 28000 was granted and paid in three installments.

The PIP is the most comprehensive program implemented by DEA to improve the existing pepper cultivations, through Good Agricultural Practices (GAP), with the objective of increasing productivity by three-fold. A package of GAP comprising items such as soil and moisture conservation, gap filling, shade manipulation, weed control, training and pruning of pepper vines as well as shade trees, adoption of integrated nutrient management measures and integrated pest management measures has been introduced. The allocated funds for this program is Rs. 20000/Ha and this is released in three installments in yearly basis as Rs. 10000, 5000 and 5000, once the items of the PIP package have been properly completed. The total export volume form 1991-2000 was 38793 Mt. It has increased by 88% in the following decade mainly due to soil conservation program, organic farming program and the PIP. Similarly, 38% increase in export volumes was observed for the latter half of 20s decade in comparison to the early half due to the effect of the same promotional programs implemented by the DEA.

Introduction

Sri Lankan share in the global pepper market is 2-3%. There is a possibility to increase export share further by highlighting intrinsic quality of Sri Lankan pepper in terms of high oil and piperine contents. Since the availability of land is a limitation for expansion of pepper area, the focus was placed on the improvement of the productivity of the existing pepper cultivations.

The formal government institution to improve Export Agriculture Sector (EAC) including pepper industry is Department of Export Agriculture (DEA). According to the 2010 Administration Report of the DEA, total extent of pepper reported in the country is 30931 Ha. Pepper is mainly concentrated in mid-country region of the country especially in Matale and Kandy districts. Approximately 38 % of pepper cultivations exist in these two districts alone. Pepper export from Sri Lanka was reported to be 12218 Mt in 2010. This paper discusses the steps taken by the government sector through DEA to improve pepper production and productivity in the country.

Past programs focused on expanding pepper cultivations and fertilizer usage

Subsequent to the establishment of DEA in 1972, steps were taken to increase the extent of pepper cultivations since land was not a limiting factor at that time. Pepper as a monocrop and intercrop with major export crops such as coconut and tea were also promoted. The assistance scheme was the major motivational tool used to encourage farmers for the establishment of EAC. In 1986 subsidy scheme Rs. 7500 was paid for new planting of an acre of pepper. In the revised assistance scheme in 1997, pepper planting subsidies were increased from Rs. 7500/ac to Rs. 12000/ac and was paid in four installments: after land preparation, six months after planting, 18 months after planting and 42 months after planting for establishment of 0.5 ac or more pepper cultivations.

A homegarden development assistance scheme was introduced in 1995. Pepper plants up to 200 were given free in this program. A cash subsidy of five rupees was paid after three years of planting for the number of plants successfully established in the field. Pepper was also identified as an important crop in homegarden development programs implemented by Integrated Rural Development Programs (IRDP).

The above assistance schemes were aiming at expanding the extent of pepper. However, the plants have to attain the required growth levels to become qualify for assistance schemes. By means of technical advice, farmers were motivated to undertake maintenance activities in their pepper cultivations.

Fertilizer promotional and soil conservation programs

Realizing low yield levels (450 kg/Ha), in the mid 90s, a fertilizer promotional program was started to popularize fertilizer usage. In this scheme fertilizer was given on cost sharing basis. At the start, cost of the half of the recommended amount of fertilizer was borne by the department when the cost of the other half of fertilizer was paid by the farmer. The range Extension Officer had supervised whether the correct quantity was applied as had been instructed. In that scheme the government share had been gradually withdrawn. In the first year 50% of fertilizer cost was borne by the government. In the second year onwards the government share was reduced to 25%.

In 1990 a soil conservation program was carried out in selected districts such as Matale, Kandy, Kegalle and Badulla. Along with this program proper maintaining of pepper cultivations was also encouraged.

Programs focused on integrated nutrient management

Financial assistance for improving pepper was temporary suspended between 2002 and 2005 due to financial constraints. Therefore, supplying of free planting materials and advisory programs took a major part in the promotional programs. Since 2005, development programs were geared to promote organic manure production and usage. Organic manure production program, integrated fertility management demonstration program and Productivity Improvement Program (PIP) are such promotional programs associated with pepper industry.

In the organic manure promotional program, production of compost heaps were promoted. Rs. 200 for making 50 feet³ was granted. One unit of 50 feet³ was expected to be produced in 0.25 ac of pepper whereas four units were granted for one acre pepper block giving Rs. 800 for preparation of compost. In 2008, 120 Ha of pepper were grown organically in the country.

Assistance was granted to integrated fertility management demonstrational plots in 2008 and is being continued in 2011. For one acre demonstration plot Rs. 28000 was granted for three year period. This assistance was given to establish a live-fence for obtaining leaf manure, gliricidia shade tree pruning, organic manure production and purchase of chemical fertilizer half of the recommended quantity. For the first year the installment release was Rs. 12000 and for subsequent occasions Rs. 8000 for each year. Delpitiya sub research station was converted into a model organic farm and a training center in order to train organic farmers in Midcountry area in 2005. Plantation advisory unit was established in 2003 to visit plantations and advice them to undertake pepper planting and maintain the existing pepper plantations.

Productivity Improvement Program (PIP)

This is the most comprehensive program ever implemented, since the inception of DEA, for the uplifting the productivity of the existing pepper cultivations. The current productivity of pepper per hectare is 559 kg. However, in research conditions three-fold yield increment can be expected. This program was started with the understanding of low productivity of the existing EAC and the potential of enhancing the productivity through adoption of Good Agricultural Practices (GAP). The program was implemented in 2004 for revitalization of the existing EAC including pepper cultivations.

A package of agronomic practices such as soil and moisture conservation, gap filling, shade manipulation, training and pruning of pepper vines and shade trees, slash weeding, adoption of integrated nutrient management measures and adoption of integrated pest management measures have been included in the PIP program. Other activities such as removal of non-

productive basal runners and hanging vines, control of earth loosening ants around the base of the vines, adoption of non-chemical disease control measures such as improving drainage of soil, shade manipulation and removal of infected parts of the vine etc have been promoted. Usage of weedicides was discouraged; instead slashing and ring weeding were promoted. Similarly fungicides were discouraged except incidence of outbreak of quick wilt.

Adoption of the above mentioned measures is expected to be fulfilled to qualify for free chemical fertilizer and cash grant. However, the fertilizer supply is for three consecutive years and was about 10% of the requirement of pepper crop. The allocated funds for the PIP program for development of pepper were 20,000 rupees/Ha. This was paid in three consecutive years, the first being Rs. 10,000, the second being Rs.5000 and the final one Rs. 5000. The balance of the nutrient requirement of pepper vines is to be covered from organic manure and *gliricidia* leaf manure. Production of organic manure on a continuous basis is encouraged and expected.

Shade pruning is given a high priority in the PIP. *Gliricidia* is the predominantly used support tree in Sri Lanka. Shade pruning in pepper has several advantages such as facilitate pollination, reduce premature spike shedding and facilitate photosynthesis hence high berry filling. Lopped parts of *gliricidia* tree provide green manure. Experimental evidence support that half of the fertilizer requirement can be curtailed by applying 10 kg of fresh *gliricidia* leaf matter. The availability of green matter according to lopping frequency has been examined. If *gliricidia* pruning is practiced once a year the obtainable green matter is 2 to 3 kg from single support tree. The maximum possible *gliricidia* leaf matter (5 to 8 kg) from a tree can be obtained, if pruning is practiced once in 3.5 months. With the introduction of the national fertilizer subsidy scheme in 2011, a 50 kg pack of pepper fertilizer mixture is available at Rs. 1300. Therefore, present PIP mainly focuses on promotion of organic manure production rather than subsidizing for inorganic fertilizers.

Under 'one-crop for one-village' program, which was implemented from 2009 to 2010, selected pepper villages were developed giving more inputs like ladders, pruning knives and slashing knives besides, adopting the measures stipulated in the PIP. This program not only improves productivity of pepper but also look into marketing aspects for pepper products by linking traders with the producers to maintain competitive prices. More attention, better utilization of resources and systematic farming were encouraged by this program.

Outcome of the Productivity improvement programs

Total pepper export volume from 1991 to 2000 was 38793.2 Mt whereas for the decade commencing from 2001 it was 72849.6 Mt, indicating that 88% increase in the production. The expansion of pepper cultivations was the focus in 90s decade. The soil conservation program, organic farming program and the PIP have been implemented in 20s decade in addition to new planting. The improvement of yield levels due to all these programs reflects through substantial increment of export volumes.

The export volumes from 2001 to 2005 and 2006 to 2010 were also compared. The total export volumes for these two periods were 30613.2 Mt and 42236.4 Mt respectively indicating 38% increase of exports in the latter half. The Table 1 shows the developed extent of pepper from new planting program and PIP.

Table 1. The extent of pepper developed by new planting program and the Productivity Improvement Program, estimated total production from 2004 to 2010 and percentage increase of total production as against 2001 total production

Year	Extent of pepper developed through PIP (Ha)	Extent of pepper developed through new planting program (Ha)	Estimated total production (Mt)	Percentage increase of total production as against 2001 production
2004	456.6	677.8	12020	30.0
2005	1444.0	738.9	14270	54.2
2006	646.0	408.0	14440	56.1
2007	702.6	462.8	10377	77.1
2008	1212.0	755.2	12897	39.4
2009	829.2	571.0	15767	70.5
2010	843.4	727.7	17332	87.4
Total	6133.8	4341.4	97103	

(Source: Administration Reports of the Department of Export Agriculture, Sri Lanka)

According to table 1, the PIP extent is 41% more than the newly planted pepper cultivations. Generally newly planted pepper takes about five years to give satisfactory yields. Therefore, the 38% increase in export volumes in the latter half of 20s can be attributed to the effort given by the DEA to increase productivity of the existing pepper cultivations implemented in the early half of the 20s.

The total production of pepper in 2001 was 9250 Mt. Percentage increase of total production as against 2001 production was calculated for each year commencing from 2004 and presented in table 1. An increasing trend of production is visible from the table except for year 2008. This reduction may be attributed to stock keeping and undesirable weather conditions.

Annual production and exports could not be related to these productivity enhancing programs due to short term fluctuation of exports and farmers' tendency of keeping stocks until pepper prices become satisfactory.

Granting assistance and giving technical advice are not only factors affecting pepper production. Other factors like climatic factors also play a role.