

CONSERVATION FARMING: VITAL FOR SUSTAINED AGRICULTURAL PRODUCTION

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Conservation farming can provide the answer to many of the problems that keep arising in the attempts to increase the country's agricultural production maintains A. S. Widanapathirana, Research and Training Officer of the Agrarian Research and Training Institute. In this paper he shows that conservation farming which is a broad system of land, water and power use could be utilised to achieve sustained high agricultural output while minimising the depletion of natural resources and reducing the use of expensive inputs such as energy, machinery, fertilizer and agro-chemicals. Sri Lanka's present pattern of land and resource use warrants the adoption of conservation practices in almost all farming systems; while much could be done to make conservation farming techniques a viable system of farming.

Whether under rainfed or irrigated farming or in cash crop or plantation agriculture, increasing of agricultural production has long been a formidable challenge in this country. Many approaches have been proposed to self sufficiency in agriculture. A salient feature of all schemes, however, is the increased utilization of expensive inputs such as fertilizer, chemicals, labour and other resources. Experience indicates that higher yields are closely associated with higher doses of agricultural inputs including labour. But can Sri Lanka continue to depend on imported chemicals, tractor power and energy for our agricultural operations? The answer is: certainly not.

The present pattern of land and resource use warrants the adoption of conservation practices in almost all farming systems in Sri Lanka. The over-use of land resources in tea, rubber, coconut and other permanent crops has already led to lower soil fertilities and severe erosion loss. It is also reported that non-availability of farm power has frequently delayed timely cultivation of paddy. Chena cultivation practice which destroys forest resources occupies a substantial portion of land use in Sri Lanka. Moreover, destructive types of cultivation can no longer be perpetuated particularly in the present context of high population growth.

Although we appreciate conservation of soil resources, can we improve agricultural output by conserving the use of other inputs? Conservation farming provides solution to minimize the use of inputs.

Conservation farming is a broad system of land, water and power use that aims to

achieve sustained high agricultural output while minimizing the depletion of natural resources and reducing the use of expensive inputs such as energy, machinery, fertilizer, and agro-chemicals. The objects of conservation farming are:

- (a) To conserve scarce water, land, capital and time;
- (b) To minimise the use of inputs including expensive agro-chemicals, fertilizers, labour and energy and,
- (c) To minimize the use of cost free natural resources such as sunlight and precipitation, in farming operations.

Conservation farming involves the use of many techniques and the particular mix depends on the system of farming under consideration; accordingly the method of conservation farming adopted on a high-land cash crop will be different from that of a plantation crop. However, conservation farming essentially incorporates few principles whether in the production of annual crops or the cultivation of commercial crops, which are explained below:

- (a) No - till:

Tillage refers to soil cultivation or disturbance primarily to control weeds and in some cases to incorporate fertilizer into the soil. Although tillage requires a substantial portion of resources in terms of energy, time and capital, the gains in productivity attributed to this practice are not appreciable. In addition, the distur-

bed soil is prone to erosion losses which lead to lowering of soil fertility.

Conservation farming involves no-tillage which makes use of other techniques in order to control weed growth. No-tilled soil is less prone to erosion and soil structure is preserved which is vital for sustaining agricultural productivity.

(b) Use of Mulches:

Either dead or live mulches are extensively used in conservation farming in order to suppress weed growth, conserve water and soil. In the case of dead mulches, grass clippings, stubble, crop residue etc. are placed to cover soil surface whereas the live mulch involves the growing of cover crops over land area. Another desirable effect of soil mulching is that it enhances earth worm activity, making soil to be porous. The decay of dead mulches add nutrients while live mulches make many nutrients available to crop plants.

(c) Avenue Cropping:

Avenue cropping refers to row planning of medium growing leguminous tree crops such as *ipil-ipil* and *gliricidia spp.* The crop is established between rows of leguminous trees, which are lopped before the establishment of crop plants. The tree-lopings provide a good mulch to growing crop plants. The woody material on the other hand, is a valuable source of firewood. Trees on the avenue grow together with the crop and may be lopped again should there be insufficient sunlight for the growth of crop plants. The deep root system of leguminous tree crops absorb nutrients which may have leached down the soil profile and makes them available to crop plants by way of loppings. The tree avenues also reduce the speed of desiccating wind and create a desirable micro-environment for the better growth of crop plants.

d) Simple Tools:

In conservation farming much attention is paid to chemical controls of weeds. Therefore, weedicides are used at reduced levels of intensity where volume of liquid is 10 times less than that required by conventional spraying is adopted, which controls weeds effectively. Seeds are planted under the mulch by a specially designed seed planter. Fertilizer is injected into the soil through a specially designed tool. Therefore, conservation farming requires certain less expensive simple tools, which could be locally manufactured.

PROBLEM AREAS

Although conservation farming can be appropriate under all farming systems, it is not wholly trouble free. As was discussed in the preceding sections, conservation farming emphasises the use of mulches, crop stubble etc. which provide a source of food for many insect pests. Often disease causing organisms thrive on crop stubble until new crop is estab-

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lished which then transfer into the growing crop plant. Therefore, pest and disease infestations can be acute and more emphasis may have to be placed on their control.

Yet another problem is that it may be difficult to educate farmers, particularly the chena farmers on the usefulness of conservation farming techniques. The chena farmer is interested in the establishment of a temporary 'farm' adopting destructive farming operations. In permanent farms are to be established in place of chenas, then the question of land rights needs to be solved, which may be much more difficult. Moreover as it takes sometime to decay crop stubble and mulches and to build up the natural fertility of the soil the benefits of this system of farming are not immediately visible or felt by the farmer. In general, it becomes a difficult task to convince farmers of the significance of conservation of resources in farming operations as conservation does not bring about immediate results.

What more to be done ?

Many things could be done to make conservation farming techniques a viable system of farming. First more research is necessary, particularly with regard to different agronomic practices, implements, types of trees suitable for avenues, techniques of pests and disease control etc. Much attention may have to be placed on the study of natural insect pest fluctuation in the design of non-chemical control measures. Second, it is also necessary to undertake research to determine the optimum size of a holding which maximises returns. Furthermore, studies on cost and returns to conservation farming should also be evaluated. The third area of attention is related to the provision of land rights for bona-fide chena farmers, who will not adopt long-term conservation measures unless the legal right to cultivate land is vested in them. Fourth, sufficient encouragement and incentives should be given for those who volunteer to adopt techniques of conservation farming. The subsidy grant which motivates rubber growers to cultivate leguminous ground cover is a positive case of success. Through other incentive schemes farmers should

be motivated to participate in conservation farming programmes.

As was discussed above, conservation farming consumes less energy compared to conventional farming and water is retained within the root zone of crop plants, erosion loss is reduced, soil fertility and crop productivity are maintained to satisfactory levels. In effect, therefore, conservation farming involves the use of resources in harmony with nature which results in the preservation of environment.

It can therefore be concluded that conservation farming is appropriate under all farming systems in Sri Lanka. It is very opportune that this system of farming is further developed and adoption of conservation practices is encouraged in areas where waste use and over exploitation of resources have been reported in this country. The need for further research and an effective farmer education programme towards conservation farming, however cannot be under estimated.