

HOW SUSTAINABLE IS ORGANIC FARMING? : A COMPARISON OF ORGANIC AND CONVENTIONAL PADDY FARMING IN WESTERN PROVINCE, SRI LANKA

Abstract

Sustainable agriculture is one of the greatest challenges that the world is facing today. Sustainability implies that farming practices not only enhance food security, but that its environmental, socio-economic and human health impacts are minimized. To minimize adverse effects of conventional farming methods to the environment, the organic farming is considered as one of the best alternatives. In this study, the sustainability of paddy cultivation was compared in conventional and organic cultivations in Colombo district in the Yala season in 2016. This study focused on basic growth and yield parameters of selected paddy varieties under conventional and organic farming settings.

Three plots from each setting were selected. The basic growth parameters such as root shoot biomass ratio, plant height, number of seeds per panicle and number of tillers per plant were investigated. As yield parameters, weight of 100 grains and yield per square meter were measured.

When compared with the standard values for paddy, root shoot ratio, plant height, number of seeds per panicle and number of tillers per plant were acceptable. Weight of 100 grains and yield per square meter were less than the standards in both settings and the reduction of yield was much larger in the organic cultivation. Given the organic farming is not economically attractive, it was evident that most farmers fail to adhere to a “fully organic” farming practice.

The results of this study emphasize the need for more investigations as well as increased attention of and support from the policy makers to promote sustainable organic farming.

Keywords: conventional, growth parameters, organic, paddy, sustainability.

Introduction and research problem/issue

Mitigation of the adverse impacts of agriculture is one of the key challenges that the world is facing today and organic farming is practiced as an alternative. Rice (*Oryza sativa*) is cultivated in Sri Lanka as the staple food, which is a key user of fresh water resources in the island. The impacts of rice cultivation on the environment have become a highly debatable issue since many environmental and health problems are associated with it. “Going organic” is one of the emerging trends in the country recently because it is believed that organic farming has less environmental and health impacts compared to conventional farming. Organic rice varieties are becoming popular and the government has launched a programme “wasa visa nethi ratak (a toxic free nation) to promote such practices.

Yet, systematic studies on the sustainability of organic rice farming are sparse in the global literature and no adequate information is available on organic farming in Sri Lanka.

The current study was conducted with the goal of investigating the sustainability of paddy cultivation in conventional and organic settings in Colombo district in the Yala season 2016.

Organic farming in this research refers to application of only organic fertilizer and no other chemical use in any stage of cultivation. As specific objectives, growth and yield parameters of rice varieties under two farming methods were compared with the reference values obtained from the Department of Agriculture.

Research Methodology

Two different paddy cultivations were selected from each farming method (conventional and organic) within Colombo district. Conventional cultivation was in Pillewa, where organic field was located in Papiliyana. Plots were selected from each setting with the water flow (top, middle and bottom).

In the current study, the characteristics of two farming practices were selected to represent the growth and yield. Investigations reported here included field sampling as well as laboratory studies. The growth yield parameters included root shoot biomass ratio of the paddy plant, plant height, number of seeds per panicle and number of tillers per plant. Selected yield parameters were weight of 100 grains and yield per square meter of paddy field. All samples were replicated and the mean was taken for analysis. All plants were removed, when needed, with minimal damage to the plant following standard study protocols. The reference values for each paddy variety were obtained from Bathalagoda rice research and development institute and Bombuwala rice research station.

By measuring the dry weight of roots and shoots separately, the root shoot biomass ratio was calculated. The plant height was measured by using a measuring tape from tip of the highest plant leaf to the ground. Twenty panicles from twenty plants from each plot were randomly selected and the seeds in each panicle were counted manually. Similarly, the same number of plants from each plot were randomly selected and number of tillers per each plant too was counted manually. Hundred grains of paddy obtained from each plot from 20 plants were weighed using an analytical balance. The weight of paddy yield was obtained by using an analytical scale. The total surface area of each paddy plot was obtained and the yield per square meter was calculated. All data were analyzed using MINITAB version 16. Box plot analysis, one way ANOVA tests and one-sample T-tests were performed.

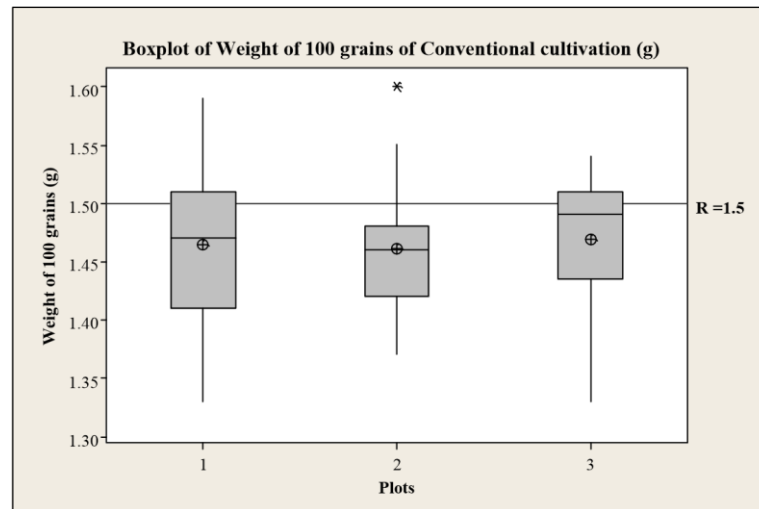
Results and findings

The present study reveals some important information on organic and conventional paddy farming.

When root shoot biomass ratio are compared, the values obtained for conventional cultivation were less than the organic cultivation. This indicates that in conventional farming practices, the overall health of paddy plant is better than that of organic since the dry weight of shoot is higher than the roots in the ratio. The root shoot ratio can be reduced under different factors which included favorable weather, fertilization, irrigation, pest control and aeration. In the plant height, a significant difference can be seen in both cultivations. The plant heights were greater in both cultivations than the reference values of the variety. Number of seeds per panicle was higher in organic cultivation compared to the reference value. Yet, such difference was not observed in conventional paddy plants. Number of tillers per plant was

greater in both cultivations compared to the respective reference values. The tillers of paddy plants depend on the distance between two seeds falls to the soil while sowing. According to the literature and the farmers' experience, less distance between plants influences the plants to gain maximum tillers due to competition for resources.

According to the above three parameters, it can be implied that the plant growth of both cultivations were in good conditions. Nevertheless, the picture is different with respect to the yield. When compared the weight of 100 grains, both cultivations had lesser values than reference values and this difference was significantly lower in organic cultivation (Figure 3.1 and Figure 3.2).



The organic paddy field used to obtain samples for this study did not use any pesticide which may have contributed to the reduction of filled grains. Contamination of seed stocks with pests were not adequately treated due to refraining from using inorganic chemicals. The farmers involved were to adhere to totally organic practices with only natural materials. Thus, there was a remarkable reduction in the harvest when

Figure 3.1: The variation of weight of 100 grains in conventional cultivation

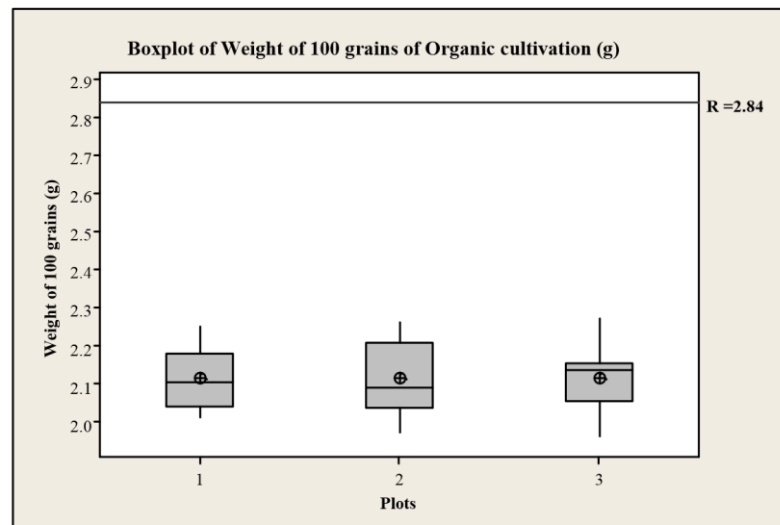
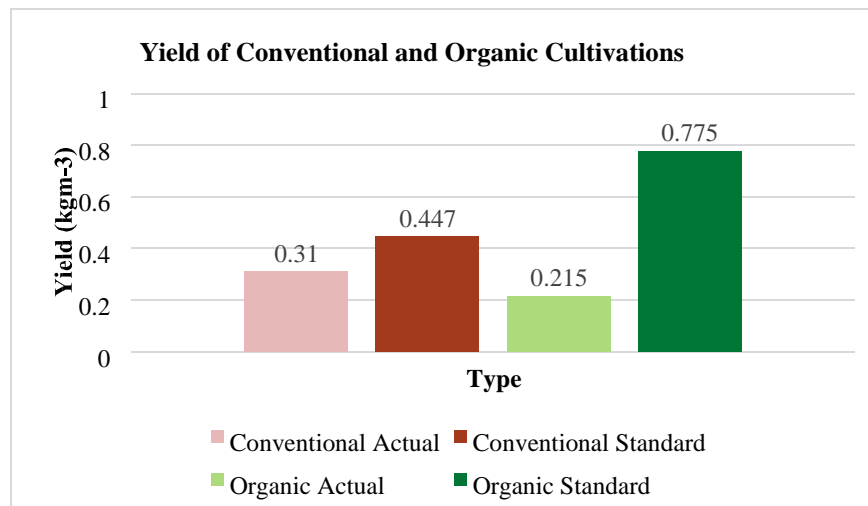


Figure 3.2: The variation of weight of 100 grains in organic cultivation attributed to the small flood event occurred during farming.



compared to the standard values under conventional practices (Figure 3.3). In contrast, a reduction of harvest was also evident in conventional farming to a lesser degree which may have

Figure 3.3: The variation of yield of both cultivations with standards

Conclusions, implications and significance

This situation warrants attention of the authorities, farmers and all other stakeholders. Even though organic cultivation is beneficial for the health of farmers and consumers as well as being environmentally friendly, it is obvious that the poor or reduced yield discourages the farmers to practice organic farming. It was also noted that in most of the instances, farmers claim that their cultivation is organic yet apply chemical fertilizers and pesticides. The Sustainable Developmental Goals (SDGs) specified by the UN empathizes on ensuring food security and environmental sustainability. Yet, our study reports the dilemma of going organic with a lesser yield in the present context. To promote organic farming and sustainable agriculture, intervening of the authorities is essentially needed with the aim of enhance economic security of farmers.

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