

Yield optimization of chilli and string bean for different levels of spacing and organic fertilizer under intercrop and monocrop systems

K. Shivatharsinii^{1*}, S.B. Siyambalapitiya² and K. Jeyavanan³

¹*Department of Mathematics, Faculty of Science, University of Peradeniya, Sri Lanka,* ²*Department of Engineering Mathematics, Faculty of Engineering, University of Peradeniya, Sri Lanka,* ³*Department of Agronomy, Faculty of Agriculture, University of Jaffna, Sri Lanka*
*shivatharsinii@gmail.com

The scope of agriculture is the utilization of resources in the most efficient manner. In this respect, optimization of yield in agriculture crops is needed to safeguard the farmer by minimizing the cost. In the collaboration between operation research and agriculture lays a big step up of exploitation in upcoming epoch. Hence, a new study was carried out in yield optimization of chilli and string bean in alliance with goal programming forfeit a new way for the multiple objective aspirations. From the review of literature, it can be seen that the application of optimization models is comparatively less in scientific world. Therefore, the study which was carried out on agriculture crops was to optimize the yield of chilli and string bean with different levels of spacing and fertilizer under monocropping and intercropping systems. For the crop sustainability, *Azospirillum* mixed fertilizer was used to make the system as organic. Yield was optimized with application of input cost (weeding, land preparation, irrigation and planting materials) to find out the optimum yield over recommended yield through goal programming. Field plot was assigned in randomized complete block design with dimension of 3 meters length and 2 meters width. Total planting areas was assessed to be 648 square meters. Projected areas for each crop were 432 square meters. Projected areas for each system of intercropping and monocropping were 216 square meters. From this optimization model, plant number and planting material cost were reduced by 14.6 % and 14.3 % respectively. Total plant number was reduced by about 12.5 % in monocropping and 17.4 % in intercropping. Total recommended and optimized yield of green chilli under monocropping were 58 ton/ha and 51.25 ton/ha, respectively. Similarly, under intercropping, total recommended and optimized yield of green chilli were 28 ton/ha and 21.25 ton/ha, respectively. However, the recommended and optimized yield of string bean were 17.28 ton/ha and 14.9 ton/ha respectively under each system due to equal number of the population maintained in both systems. Further, the result of this optimization model is applied in field level to find out the variation.