

Abstract

In order to study the agronomic, ecophysiological and economic aspects of corn, peanut and borage intercropping, this research was conducted as split plots in a randomized complete block design with three replications at the Agricultural Research Institute of Zabol University between 1394 and 1395. Three factors include of non-consumption of vermicompost and 2.5 and 5 tons of vermicompost per hectare were examined in the main plots and different intercropping series in sub plots. These intercropping series (sole crop: corn, peanuts and borage, replacement series: A) 50% corn + 25% peanut + 25% borage, B) 40% corn + 30% peanut + 30% borage and C) 60% corn + 20 %peanuts + 20% of borage, the additive series: D) 100% corn + 50% peanut + 50% borage, E) 100% corn + 75% peanut + 25% borage and F) 100% corn + 25% peanut + 75% borage were surveyed in the sub plots. The interaction of vermicompost and intercropping series for corn (1000-seed weight, plant height, stem diameter and corn grain protein), borage) mucilage percent, total tannin, flowering and vegetative branch performance, and potassium, chlorine and total ash of plant tissue) and peanut (grain protein, oil percentage, economic and biological function) were significant. The results demonstrated that the highest corn yield was obtained in the additive series 100% corn + 50% peanut + 50% borage (12457.2 kg per hectare) and same results were achieved in concern to peanuts and borage with a sole crop. The highest ratio of land equivalent ratio was observed in the additive series of 100% corn + 50% peanut + 50% borage (2.52). The interaction between vermicompost and intercropping series for bulk density, electrical conductivity, acidity, and organic carbon content, nitrogen, phosphorus, potassium, sodium, calcium, and magnesium were significant after harvesting and absorbing of active photosynthesis radiation. The amount of organic carbon in the additive series was higher than the replacement series. Additive series of intercropping in comparison to the replacement series absorbed more radiation (with an average of 74.98%) and were superior in this respect. The results of competitive indices indicated a high competitive ability of peanut in intercropping with two other plants. In the economic evaluation, intercropping, additive and replacement series, net and gross income were higher than that of the sole crop of corn and borage. The benefit-to-cost ratio in the two-year experiment was higher in the intercropping replacement series. The additive series 100% corn + 75% peanut + 25% of borage had the highest relative value total (1.50). Based on Kriging modeling, the parameters of planting ratio, photosynthesis active radiation (PAR), moisture, and phosphorus had the highest effect on the yield of three plants .

Keywords: Economic yield, Net income, Soil elements, Photosynthesis active radiation, Competitiveness index .



University of Zabol
Graduate school
Faculty of Agriculture
Department of Agronomy

The Thesis Submitted for Ph. D. Degree in Agroecology

**Assessment of ecophysiological, economical and competitive
aspects of maize, peanuts and borage intercropping using
Kriging modeling**

Supervisor:

Dr. M. Dahmardeh

Advisors:

Dr. I. Khammari

Dr. B. Keshtegar

By:

Mahdieh Rajaei

Winter 2019