



University of Zabol
Graduate School
Faculty of Agriculture
Department of Agronomy and Plant Breeding

Thesis for the degree of Ph.D. on Agroacology

Ecophysiological investigation of intercropping of maize and bean under influence of biofertilizers and agroforestry systems

Supervisors:

Dr. Mahmood Ramroudi

Advisors:

Dr. Mohammad Galavi

Dr. Masoud Rafiee

By:

Auob Amiri

2021

Abstract

In order to evaluate biofertilizers on ecophysiological traits under the influence of mixed cultivation of corn and cowpea in the agroforestry system of corridor cultivation, an experiment was carried out in the form of single-chopped plots in the form of a basic design of randomized complete blocks with three replications in two crop years 2015-2016 and 2016-2017 in the forest garden of the research station of Payam-Noor University, Al-Shatar city. In recent years, the low stability of conventional farming systems, land degradation and reduction of soil fertility have become a big threat to agriculture, this has led to more attention to sustainable farming systems including mixed farming and corridor farming (agroforestry) in the regions. In order to investigate the benefits of tree-based mixed cropping systems, this experiment with corn and cowpea mixed cropping treatments at five levels including: single corn, 75% corn + 25% beans, 50% corn + 50% beans, 25 The percentage of corn + 75% of beans and single beans as the main factor and the use of biological fertilizer at three levels including: seed inoculation with Azotobacter and Azosperlium at the rate of 100 and 200 grams per hectare and without inoculation (control) as a secondary factor in were considered. The results of composite variance analysis showed that the ratio of planting and biofertilizer had a significant effect at the level of one and five percent on seed yield, yield components, biological yield, and concentration of copper, iron, phosphorus, zinc, and seed protein of corn and cowpea. The comparison of the averages showed that the highest performance of corn (12.550 tons per hectare) and cowpea (4.050 tons per hectare) in the interaction of 75% corn + 25% cowpea and seed inoculation with 200 grams Bacteria were obtained per hectare. which was 54% and 27% superior to their pure cultivation, respectively. The land equality ratio in the planting treatment of 75% corn + 25% beans had the highest value with an average of 1.55, which indicated the benefit of mixed cultivation compared to the pure cultivation of these two plants. According to the results, it is possible to obtain high grain yield and protein in mixed cultivation compared to their monoculture, and the best treatment is 75% corn + 25% cowpea with seed inoculation at the rate of 200 grams of bacteria per hectare.

***Keywords:* Azotobacter, grain protein, land equivalent ratio, Mixed benefit, planting ratio.**