Environmental impact on yield of pea and okra grown under intercropping

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An experiment was conducted at the Faculty of Agriculture Research Station, University of Mu`tah in Rabbah, South Jordan, during summer growing season 2002. The objective was to study the effect of air and soil temperature, light intensity, soil moisture storage (SMS), evapotranspiration (ET), and water use efficiency (WUE) on the yields of okra and pea as they were grown under sole cropping and intercropping systems with four row arrangements(1:1, 1:2, 2: 1, 2: 2). A randomized complete block design with three replications was used; each plot consisted of eight rows, 60 cm apart and 4 m long. Spacing between plants within row was 20 cm and 10 cm for okra and peas respectively.

Okra and pea gave highest yields when grown in 1: 2 and 2: 1 intercropping row arrangements. Sole yields of pea and okra were 7.701 and 10.186 ton ha, $^{-1}$ respectively. The increases in pea yields were 3.51 and 3.32 ton ha $^{-1}$at 1:2 and 2:1, while those of okra yields were 5.94 and 6.52 ton ha, $^{-1}$ respectively, over their sole crops.

The increases in pea yields could be related to reductions in air heat unit (by 15.3 and 9.3), soil heat unit (by 123 and 133.3), ET (by 58 and 126 mm), in addition to increases of WUE (by 0.141 and 0.144 ton/ha/cm) as pea was grown with okra under 1: 2 and 2: 1 row arrangements, respectively, but no differences in light intensity (with the exception of 1:2 pea / okra intercropping) and SMS. On the other hand, the increases in okra yields were associated with increases in air heat unit (by 29 and 16.3), soil heat unit (by 53.7 and 55.1), light intensity (by 305 and 150 µmol.m $^{-2}$s $^{-1}$) and WUE (by 0.261 and 0.242 ton/ha/cm) under the same row arrangements, respectively. However, the other microclimatic factors were not associated with okra yield. The land equivalent ratio (LER) values under all intercropping treatments were greater than one, which gave an indication of intercropping superiority over sole cropping.

The main conclusion and recommendation which could be drawn from this research are the followings:

1. The best intercropping row arrangement that gave higher yield for pea and okra is 1:2 and 2:1.
2. A major cause of yield advantage of pea / okra intercropping is the better use of growth resources (light, temperature and water) as a result of complementary effects between the crops involved.
3. Temporal complementarily produced more advantage than spatial complementarily, but this needs further investigation.