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The Evaluation of Corn and Peanut Intercropping on Efficiency of Use the Environmental Resource and Soil Fertility

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Abstract

Order to study the effect of density, the control weed and various proportion corn (704 Variety) and peanut (Goli Variety) intercropping an experiment was conducted in 2012 in Research station of agriculture, University of Zabol. The experiment design was factorial in randomized complete block design with three replications. Experiment factors consisted of planting proportions in 4 levels (sole crop of corn, 50% corn + 50% peanut, 100% corn + 100% peanut and sole crop of peanut), control weed in 3 levels (non-weeding, once-weeding and twice-weeding) and the space between rows in 2 level (40 and 50 cm) has been considered. The evaluated Characteristics in environmental sources are (Photosynthetic Active Radiation, Temperature and soil Moisture), the nutrients of soil include (N, K, Na, Mg, Ca, and C) and to evaluate intercropping of pure was used land equivalent ratio and economical yield. All Characteristics of study were affected by planting system.There was significant interaction between planting system, weeding and density in the absorption of light, temperature and moisture of soil. The results showed that photosynthesis active radiation absorbed by the intercropping was higher than sole crop in both plants. The results showed that changes in soil nutrient capacity of single elements (Na and K) in the treatment of mixed and monoculture peanut was more than monoculture corn and divalent elements (Ca and Mg) in mixed and monoculture corn more than mixed replacement and peanut monoculture. The highest land equivalent ratio (1.048) was accounted additive intercropping. Generally the mixed cultures with increasing density and control weed caused increase soil fertility and amount of soil nutrients after harvest. Treatment 100% Corn +100% peanut was the best treatment because using sources and increasing soil fertility and crop yield in comparison to sole crop.

Keyword: photosynthesis active radiation, volumetric soil moisture, soil moisture, land equivalent ratio

1. Introduction

Although agriculture is still one of the most important activities done by man on earth, the harmony between agriculture and nature and also with achievements in innovative sciences has been disturbed and the destruction of planting lands and natural sources in the world and polluting water and soil by agricultural and increasing population shows a gloomy future to man, so, considering sustainable Agriculture is vital (Marschner et al., 2003). In many parts of the world, intercropping as a way of the most common in Agro ecosystem is used, that has lots of advantages in comparison to sole crop (Banik et al., 2006). In monocultures system rarely all moisture, nutrients and light that are available for plant, the weeds in ecologic niche attack them so that the used plants in compound in consumption of complementary sources, so intercropping with more consumption of sources and filling ecologic niches that are empty causes better controlling and more effects on weeding in comparison to monocultures planting (Liebman & Davis, 2000). The researchers believed the advantages in intercropping is maybe because of a combination of different factors such as better use of moisture in soil, light and nutrients. They believed that the effectiveness in intercropping is: difference in the structure of root, sharing and food needs in plants (Pandita et al., 2000). Intercropping helps to increasing fruitfulness and supporting physical structure of soil (Vasilakoglou et al., 2005). According to the researcher's report legume intercropping (Vetch, yellow clover and alfalfa) with sunflower causes more soil covering, less erosion and increase in carbon, nitrogen in soil (Kandel et al., 2000). Because of different ecologic niches in intercropping, more light receives comparison to sole crop (Tsubo et al., 2004). Researchers by comparing the usefulness of light in intercropping and pure corn and bean reported that the useful light receiving in intercropping in comparison to pure was better.

They believed that the more dry matter aggregation in mixed culture in mostly because of receiving more light. They reported that more receiving light in sole crop in relation with photosynthesis corn (Tsubo et al., 2001). The use of different parts of soil by plants in intercropping is because of the difference in root, distribution depth, root distribution and density of lateral roots, and competence for moisture reduces it to the least. In treatment in bean intercropping and wheat because of decreasing in soil temperature level evaporation reduces and increased water use efficiency (Ghanbari, 2000). The difference in morphology in plants root in intercropping and the chance of leaking in plants causes density root in more soil and these causes absorbing more water in comparison to monocultures (Zhang & Li, 2003).

2. Materials and Methods

The research was done at agriculture research at Zabol University in planting year 2012. The location of the research was 483 meters above sea level, 61:41 from east and 30:41 from east and 30:45 from north. Soil of research was sandy loam with pH=7.9 and EC=2.8 ds/meter. According to coupon classification the weather in dray and hot climate with the average 49 mm annual rainfall. The test in the form of 2×3×4 in completely accidental blocks designing was repeated for about 3 times. The first factor includes different planting rations in four stages (Z: Corn, P: peanut, M1: 50% cron+50% peanut, M_2: 100% corn +100%. Peanut), the second factor; weeding in 3 stages (w: without weeding, w_1: once weeding, w_2: Twice weeding) and the third factor, Spacing between rows in twice levels (D_1: 40 cm and D_2: 50 cm). Peanut planting (Goli Variety) and corn (704 SC) according to planting orderings is to totally 72 plots. Each plot includes 4 rows planting that twice lines of that are assumed as border, 6 meters long with space in mentioned rows and between 2 plots twice rows were left without planting. According to findings by analyzing soil before planting 350 kg of urea, 300kg triple superphosphate and 100 k.g sulfate potassium in a hectare for sole crop and corn intercropping and 50-50 50 kg nitrogen in a hectare, phosphorus and potassium are mentioned sources to peanut planting. Fertilizers road was added in 2 stages one 22 days after planting and the remaining of it before blooming. The tested land was deep tillage in autumn. At the beginning of March to squash the small stones 2 disks were vertically connected. Intercropping treatment was done with additive and replacement way. Planting ratio was done by density bush changes (change between Twice bush on row) and changeable spacing between 2 rows (40, 50 cm) was done, the two fixed rows and plant spacing's on the additive treatment declined. A total of 60 and 80 plants corn and peanuts in treatment 100% + 100%, 30 and 40 plants corn and peanuts on each row, there was a 50% +50%. Watering was done according to the times that plant needed. All of the treatments were farmed by one row of peanut and one corn. The planting time in the growth period were watering and working. To calculate the final operation after removing 2 lines of margin and 0.5 meter from the beginning and the ending of each plot was done photo synthetic active radiation was evaluated by radiation machine model: DELTA-T. Light measurement in sunny days from 12:30 to 13:30 and 90 days after planting was done. The level of light above the canopy and soil level in five parts inside each plot was random measurement and the average was recorded. Final received amount of PAR in ratio of received radiation by plants got radiation and calculated on tip of canopy (Bantilan et al., 1976).

$$\%PAR= [1- (PAR_b / PAR_a)] \times 100 \quad (1)$$

PAR_b: photosynthetic active light at the lower part of canopy, PAR_a: photosynthetic active light at the highest part of canopy. Ninety days after planting in depth of 0-15cm at noon in a sunny day the temperature of soil was calculated. To do this we put the thermometer in 3 parts in each plot between the planting rows in depth of 15 cm and the average was calculated. As we expected the balance water- soil was affected by different planting systems and water- soil content in one step during the growth period (90 days after planting) in 0-25 cm depth was calculated. We took 100 cube- meters in each treatment of soil by a special ring and after that we put it on over machine in 110 degrees and after 2 days dry weigh again was weighed. Then we calculated wet amount of soil in each treatment of test by this amount (wet weigh) and then we put it on over oven in 110 degrees and after 2 days dry weigh again was weighed. Then we calculated wet amount of soil in each treatment of test by this formula:

$$Q_t= V_m / V_t \quad (2)$$

Q_t= wet amount percent, V_m= amount of water Soil (difference between wet and dry weigh), Vt = All of sample soil (100 cm^3). to know about soil nutrients amounts after harvesting in ratio to calculating soil nutrients (N, K, Mg, S, P and K) "N" by kejeldal, "C" by walky black method, Ca and Mg by method absorbing atom machine, "Na" by taking filled- flower watering a "K" by taking Asetat Amuniyom 1 normal by flame photometer type corning 405 calculated and amount of each nutrients was calculated. To evaluation intercropping of land equivalent ratio (LER) was used. This index of advantage in intercropping and the level of competence among the same types or helping intercropping system were said that by the use of the formula is calculated: (Vandermeer, 1992; Li et al., 1999; Fetene, 2003):

$$LER = Y_{ca}/ Y_{cc} + Y_{pa}/Y_{pp} \quad (3)$$

That relation Y_{ca}/ Y_{cc} the corn yield ratio in intercropping with peanut (lateral LER). LER=1 shows the same production in monoculture and intercropping. In yield of biological intercropping result is more than monoculture and LER<1 showing lack of advantage intercropping (Mazaheri, 1998). The data were analyzed by SAS software and in spite of significant effect on doing test to compare the averages on LSR in probable level 5% was used.

3. Result and discussion

3.1 Pattern Effects, Weeding and Density of Economical Yield

A perusal of data (Table 1) indicated that economical yield significantly influenced by density. Maximum economical yield for corn (3.18 ton/ha) in additive intercropping and Maximum economical yield for peanut (9.43 ton/ha) in mixed replacement were recorded (Table 2).

Table 1. Analysis of variance for economic yield of intercropping corn and peanut

sov	df	Economical yield	
		Peanut	Corn
Replication	2	101.92**	95.13**
Planting system	2	5.56^{ns}	0.02^{ns}
Weeding	2	29.63**	0.17^{ns}
Density	1	48.75**	8.76**
Planting system × Weeding	4	7.58^{ns}	0.09^{ns}
Planting system × Density	2	4.54^{ns}	0.65^{ns}
Weeding× Density	2	62.30**	0.12^{ns}
Planting system× Weeding× Density	4	3.14^{ns}	0.02^{ns}
Error	34	3.30	0.24
CV (%)	-	20.06	15.78

*, ** significant at p<0.05 and p<0.01, respectively.

In both plant with most weeding increased crop yield. The maximum of economical yield for peanut (10.51 ton/ha) and corn (3.21 ton/ha) were recorded in twice weeding treatment, but density wasn't similar result in the both plant. The result was shown that highest of economic yield for peanut (10.01 ton/ha) in low density and for corn (3.53 ton/ha) in high density were recorded.

Table 2. Means of Economical yield of corn and peanut as influenced by the patterns, density and weeding different levels

Planting system	Economical yield (ton/ha)	
	Peanut	Corn
P	8.42a	-
M1	9.43a	3.12a
M2	9.33a	3.18a
Z	-	3.10a
Weeding		
W0	8.06b	3.16a
W1	8.61b	3.02a
W2	10.51a	3.21a
Planting density		
D1	8.11b	3.53a
D2	10.01a	2.73b

Note: P, M1, M2 and Z: Planting ratio, Sole crop peanut, 50% corn+50% peanut, 100% corn+100% peanut and sole crop zea mays. W0, W1, and W2: Weeding, D1, D2: Planting density, 40 and 50 cm. Any two means not sharing a common letter differ significantly from each other at 5% probability.

3.2 Pattern Effects, Weeding and Density on Efficient Use of Environmental Resources

3.2.1 Photosynthetic Active Radiation (PAR):

Photosynthetic active radiation absorbed by the system is was significantly influenced by the planting, weeding and densities and interactions between the three factors (weeding × planting system × density).Photosynthetic active in additive intercropping (79.9%) in comparison to other systems was the highest (Table 3).

Table 3. Analysis of variance for photosynthesis active radiation, temperature and soil moisture content of intercropping corn and peanut

sov	df	MS		
		T	Q_t	PAR
Replication	2	0.79^{ns}	4.87^{ns}	14.92^{ns}
Planting system	3	22.77^{**}	102.38^{**}	1220.9^{**}
Weeding	2	7.62^{**}	6.29^{ns}	903.75^{**}
Density	1	2.00^{ns}	351.11^{**}	1280.01^{**}
Planting system × Weeding	6	7.23^{**}	55.77^{**}	319.98^{**}
Planting system × Density	3	25.37^{**}	99.05^{**}	269.13^{**}
Weeding× Density	2	7.12^{**}	55.29^{**}	156.3^{**}
Planting system× Weeding× Density	6	2.77^{*}	58.55^{**}	233.12^{**}
Error	46	1.009	6.51	9.83
CV (%)	-	3.65	11.36	4.48

*, ** significant at $p<0.05$ and $p<0.01$, respectively.

Note: T: temperature of soil, Q_t: soil moisture, PAR: Photosynthesis Active Radiation.

And there was a significant treatment between this one and others. The minimum of receiving photosynthetic active in corn sole crop (60.13%). The amount of received active lighting in mixed treatment was most than sole crops (Table 4). Radiation is received more in vertical leaved plants and this structure takes lighter to reach to lower canopy parts and photosynthesis in canopy lower leaves in higher part is saved (Awal et al., 2006). According to results in table (4) there is a significant difference between different treatments weeding and density in bushes. Weed controlling received photosynthetic active radiation increased by 74% and in twice weeding treatment and more density the maximum received photosynthetic active lighting was concluded and there was a meaning fully Significant difference between treatments.

Table 4. Means of percentage photosynthesis active radiation, temperature and soil moisture of corn and peanut as influenced by the patterns, density and weeding different levels

Planting system	Temperature (°C)	Moisture (%)	PAR (%)
P	26.4b	25.6a	67.8c
M1	28.4a	21.6bc	71.1b
M2	26.6b	22.5b	79.9a
Z	28.5a	20c	60.13d
Weeding			
W0	28.03a	21.87a	63.05c
W1	27.4b	22.66a	71.76b
W2	26.9b	22.83a	74.89a
Planting density			
D1	27.3a	24.66a	74.12a
D2	27.6a	20.25b	65.6b

Note: P, M1, M2 and Z: Planting ratio, Sole crop peanut, 50% corn+50% peanut, 100% corn+100% peanut and sole crop zea mays. W0, W1, and W2: Weeding, D1, D2: Planting density, 40 and 50 cm. Any two means not sharing a common letter differ significantly from each other at 5% probability.

Between 3 factors mixed treatment 100% corn + 100 % peanut with twice weeding and more density with twice weeding and more density with the maximum received lights (88.4%). Peanut is such a plant that grows slowly and it does not have much shadow in low planting in comparison to soybean and corn, so in this plant nice planting density to increase light and increase in planting is clearer (Williams et al., 1995). In the search of amount of receiving photosynthetic active radiation in mixed canopy corn and cowpea, 100% corn + 100% cowpea treatment receives more lighting cowpea can prevent light under canopy because of having wide leaves in comparison to corn (Ghanbari et al., 2010). Peanut can stand the corn's shadow and because of having more time to grow, after harvesting corn with more growth we reach more deeds and this is because of growing efficiency of light in intercropping and peanut (Awal et al., 2006).

3.2.2 Temperature and Soil Moisture

As you see in Analysis of variance Table (2) the relation and effect of (planting system, weeding and density) has a significant moisture content and soil temperature. The highest moisture soil and soil temperature recorded in peanut (104%) and corn sole crop (105°C). With more peanut from 50% to 100% the moisture of soil has increased and the soil temperature decreased (Table 4). Because the soil temperature under Canopy in intercropping in corn sole crop the temperature of soil was less so in intercropping was more. The comparison between moisture and temperature in soil in weeding treatment and density shows more moisture and less temperature with more weeding and density. Acceding to the related effects between 3 treatment factors sole crop peanut with twice weeding and more density with having more moisture (33%) and the minimum temperature (23/33°C) treatment was tested. Less temperature in mixed systems in comparison to sole crop in corn can say more light receiving by mixed canopy and more shadow by plant canopy. Researching about moisture in intercropping of corn and cowpea among different intercropping systems shows that 15% of replacement mixed and 10% increasing mixed with sole crop with more moisture (Ghanbari et al., 2010). Plant density, received light quality, for planting was, Wind speed can have effect on canopy (Jaya et al., 2008). In corn intercropping and cauliflower in good density because of shadowing corn canopy mixed temperature is less. In mixed the positive effect of plant species increased ground cover, protection more soil moisture, decreasing evaporation in soil surface more Water use efficiency and increasing canopy moisture, decreases the temperature of canopy in sole crop (Anthony & Rene, 2008). In intercropping root systems differently causes misuse of water from soil and more receiving water and also helps more sweating. More sweating cause’s cooler microclimate in mixed and this caused that more planting coverage and less evaporation from the soil surface (Andersen et al., 2005; Innis, 1997).

3.3 Pattern Effects, Weeding, Density on Changes of Soil Nutrients

3.3.1 Organic Carbon and Nitrogen of Soil

As you see in Analysis of variance table Organic carbon and Nitrogen in soil after harvesting the product is influenced by planting system and density (Table 5).

Table 5. Analysis of variance for change soil nutrients of intercropping corn and peanut

sov	df	MS					
		C	N	Ca	Mg	Na	K
Replication	2	0.10^{*}	0.85^{ns}	10.26^{**}	0.09^{ns}	4490.51^{ns}	64.34^{ns}
Planting system	3	0.34^{**}	46.90^{**}	37.38^{**}	1.52^{**}	12876.56^{*}	230.13^{**}
Weeding	2	0.15^{**}	0.19^{ns}	10.62^{**}	1.25^{**}	5565.72^{ns}	3.44^{ns}
Density	1	0.48^{**}	58.54^{**}	19.18^{**}	0.12^{ns}	5530.01^{ns}	70.74^{ns}
Planting system × Weeds control	6	0.01^{ns}	1.19^{ns}	0.61^{ns}	0.38^{ns}	15220.22^{**}	5.38^{ns}
Planting system × Density	3	0.12^{**}	13.73^{**}	17.55^{**}	0.27^{ns}	4939.42^{ns}	24.30^{ns}
Weeding× Density	2	0.01^{ns}	1.36^{ns}	0.04^{ns}	0.74^{*}	3902.05^{ns}	4.62^{ns}
Planting system× Weeding ×Density	6	0.008^{ns}	1.79^{ns}	0.69^{ns}	0.56^{**}	9982.18^{*}	7.60^{ns}
Error	46	0.026	1.53	1.79	0.19	4011.70	28.01
CV (%)	-	23.66	17.54	22.96	2.62	26.79	25.67

*, ** significant at p<0.05 and p<0.01, respectively.

According to the Comparison of the results the maximum of organic carbon (0.82 %) and soil nitrogen (8.93%) were recorded in sole crop peanut. The amount of C and N in mixed treatment is more in comparison to corn sole crop and there is a significant difference between intercropping and sole crop treatment. About controlling weeds and density on soil nitrogen, it was showed that with more weeding and more density in amount two nutrients in soil was increased (Table 6).

Table 6. Means of soil nutrient of corn and peanut as influenced by the patterns, density and weeding different levels

Planting system	C (%)	N (%)	Ca (ppm)	Mg (ppm)	Na (ppm)	K (ppm)
P	0.82a	8.93a	4.29c	16.46b	258.50a	17.98b
M1	0.68b	7.05b	5.61b	16.64b	256a	21.04b
M2	0.75ab	7.30b	5.62b	17.14a	229.78ab	25.50a
Z	0.49c	4.99c	7.77a	16.64b	201.33b	17.91b
Weeding						
W0	0.62b	6.99a	5.19b	16.46b	218.96a	20.38a
W1	0.66b	7.04a	5.77ab	16.83a	243.21a	20.40a
W2	0.77a	7.17a	6.51a	16.87a	247.04a	21.05a
Planting density						
D1	0.77a	7.97a	6.34a	16.76a	245.17a	21.60a
D2	0.60b	6.17b	5.31b	16.68a	227.64a	19.62a

Note: P, M1, M2 and Z: Planting ratio, Sole crop peanut, 50% corn+50% peanut, 100% corn+100% peanut and sole crop zea mays. W0, W1, and W2: Weeding, D1, D2: Planting density, 40 centimeter, 50 centimeter Any two means not sharing a common letter differ significantly from each other at 5% probability.

The researchers reported corn intercropping and soybean or cereal planting with soybean causes increased yield and soil fertility (Giller, 1999; Hinga et al., 1979). Legumes increase soil nitrogen and having deep roots with wheat, water and nutrients from different layers of soil receives better (Berdhal et al., 2001). Legume plants can biological nitrogen fixation and less nitrogen can be harvested from soil, so more nitrogen will be available in the soil for crops (Assing et al., 1998). The researchers reported that When corn was grown in pure nitrogen to the soil after harvest, 0.19%, while intercropping maize with soybean, bean, corn and peanuts the amount of nitrogen In Soil was respectively 23% and 22% (Nzabi et al., 1999). The researches showed that a year of strip intercropping alfalfa and barley cause vegetation to provide suitable nitrogen for the next crop, and approximately 66 to 140 kg of nitrogen was fixed in the soil (Qamar et al., 1999).

3.3.2 Calcium and Magnesium in Soil

Analysis of variance showed that the system planting and weeding on calcium and magnesium in the soil after harvest has a significant effect (Table 5). The comparison between average planting systems show that the maximum of calcium and magnesium soil recorded respectively in corn sole crop (7.77 ppm) and mixed 100% corn +100% peanut (17.14 ppm). The minimum of two elements in sole crop peanut existed. Mixed planting systems have more calcium and magnesium in comparison to peanut sole crop (Table 6). Study about weeding and plant density shows that by more weeding and density amount calcium and magnesium in soil after harvesting the product increased. Generally the treatment combination 100% corn +100% peanut with twice weeding and the most density the maximum of magnesium soil (17.46 ppm) and corn sole crop with the most density (9.71 ppm) was better tested treatment. Peanut treatment combination with twice weeding and high density and the maximum of soil was the best treatment. For grain legumes oil such as soybean and peanut, the main nutrients are, phosphorus, sulfur, calcium and zinc, the plants can fix lots of nitrogen needed by biologically fixation (Hitsuda et al., 2005). The result of corn and cowpea intercropping showed receiving calcium and magnesium in intercropping meaning fully is more than corn and cowpea sole crop (Eskandari & Ghanbari, 2011). Legumes root, Cation exchange capacityis almost two cereal roots (Ghanbari, 2000). The plant that has more cation exchange capacity is capable of receiving more Divalent elements (Haynes, 1980; Caradus, 1990). That's why the power of competition peanut divalent calcium and magnesium absorption more from corn.

Sodium & potassium in soil there was an Effect of planting system on sodium and potassium in soil after harvest significantly (Table 6). The maximum were sodium and potassium in the soil of pure peanut (258.5 ppm) and additive intercropping (25.50 ppm). Sodium and potassium were lower in monoculture corn and a mixture of sodium and potassium treatments were more than monoculture corn and corn ratio of according to the change in sodium and potassium in the soil, planting systems was different. The results showed with more density and more weeding times the amount of sodium and potassium in soil got higher. The results showed that with increasing density and increasing the number of weeds in sodium and potassium in the soil increased (Table 6). The results showed a mixture of corn and cowpea the amount of potassium of soil in mixed additive treatment and replacement 87 and 50%, respectively were more than monoculture corn (Dahmardeh, 2010). The study of changes in soil nutrients in corn and soyabean intercropping showed that corn monoculture the potassium amount in soil after harvesting 0.72% whereas in corn and soyabean intercropping and mixed corn with bean and peanut the potassium in soil was 0.78 and 0.68% (Nzabi et al., 1999).

3.4 Land Equivalent Ratio

There's a significant difference in efficient use of land and co – relation planting effect in weeding in density (Table 7).

Table7. Analysis of variance for Land equivalent ratio in the corn and peanut intercropping

SOV	df	LER
Replication	2	0.02^{ns}
Planting system	1	0.01^{ns}
Weeding	2	0.1^{*}
Density	1	0.004^{ns}
Planting system × Weeding	2	0.03^{ns}
Planting system × Density	1	0.04^{ns}
Weeding× Density	2	0.03^{ns}
Planting system× Weeding× Density	2	0.17^{**}
Error	22	0.02
CV (%)		13.8

*, ** significant at p<0.05 and p<0.01, respectively.

According to the compared average chart we can say that the highest Land equivalent ratio in mixture of 100% corn + 100% peanut is 1.048. According to yield intercropping in the treatment of ratio monoculture showed that two legume plants and grass nearby causes intercropping produces more products in ratio monoculture and the Biological fixation by peanut roots and increasing received lights (Table 8).

Table 8. Means of Land equivalent ratio of corn and peanut as influenced by the density and weeding different levels

Planting system	LER
M1	1.006 a
M2	1.048 a
Weeding	
W0	0.96 b
W1	0.98 b
W2	1.13 a
Planting density	
D1	1.03 a
D2	1.01 a

Note: M1, M2: Planting ratio, 50% corn+50% peanut, 100% corn+100% peanut. W0, W1, and W2: Weeding, D1, D2: Planting density, 40 centimeter, 50 centimeter. Any two means not sharing a common letter differ significantly from each other at 5% probability.

One of the factors to limit peanut is use inappropriate density, because favorable plant density for Varieties and in different climate, is not the same (Bell et al., 1991). In a test on sesame intercropping with green mung, bean and black mung, peanut and sun flower, they concluded, planting sesame with peanut in ration 1: 2 the maximum Land equivalent ratio (1.35) is among other plants (Sarkar & Kundu, 2001). In chickpea intercropping and barely the maximum Land equivalent ratio in 100% treatment chickpea + 100% barely the result of it 1.25 and we can call this biological nitrogen fixing by green pea roots (Daryai et al., 2008). Weeding and interaction planting system, weeding and density a significant relation ratio and the efficient use of land was treatment by twice weeding with high density.

4. Conclusion

In using environmental sources intercropping is better than monoculture. Generally choosing suitable plants and choosing proper planting pattern in intercropping systems with controlling weeding. We can increasing the proficiency in receiving light, moisture and nutrients. On the other hand, choosing suitable plant density in intercropping with complementally mode causes better use of sources and this cause's increase yield. Generally we conclude the intercropping in one of the ways to do suitable planting with the least consumption or without external input use of things that causes more nutrients for soil and more fertility and in addition to saving water sources and soil in long terms it increases agro ecosystem stability.

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