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COTTON AND SESAME INTERCROPPING ON DRY LAND

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ABSTRACT

An experiment on cotton and sesame intercropping on dry land was conducted at the experimental garden of the Bajeng Sub, Research Institute for Tobacco and Fibre Crops Gowa, South Sulawesi. The experiment was carried out from March to August 1994, The aim was to observe the growth, yield and farm income of cotton and sesame under intercropping pattern by using various plant spacings of cotton and sesame. Arandomized block design was used with three replications. Treatments consisted of three cotton plant spacings, viz: 100 cm x 25 cm, 125 cm x 25 cm, and 150 x 25 cm; and two sesame spacings viz: 30 cm x 25 cm and 40 cm x 25 cm, single cropping of cotton and sesame. The results showed that the plant spacing of cotton and sesame in either intercropping or in single cropping affected the number of generative branches, number of bolls and seed cotton yield. Cotton and sesame yield appeared higher in single cropping than those in intercropping. However, the highest farm income (Rp 1 011 000) was obtained from intercropping cotton with sesame using cotton plant spacing of 125 cm x 25 cm and sesame plant spacing of 40 cm x 25 cm, with land equivalent ratio (LER) of 1.50.

Key words : Plant spacing, *Gossypium hirsutum*, dry land, intercropping, *Sesamum indicum*, land equivalent ratio.

RINGKASAN

Tumpangsari kapas dan wijen di lahan kering

Penelitian pola tanam kapas dan wijen dalam bentuk tumpangsari di lahan kering telah dilaksanakan di Kebun Percobaan Sub Balai Penelitian Tembakau dan Tanaman Serat Bajeng, Kabupaten Gowa, dari bulan Maret sampai dengan Agustus 1994. Bertujuan untuk mengetahui pertumbuh- an dan hasil, serta pendapatan usahatani kapas dan wijen, melalui pengaturan jarak tanam. Dalam penelitian ini digunakan rancangan acak kelompok dengan tiga ulangan. Perlakuan terdiri atas tiga kombinasi jarak tanam kapas dan dua kombinasi jarak tanam wijen, jarak tanam kapas : 100 cm x 25 cm, 125 cm x 25 cm, dan 150 cm x 25 cm; sedang jarak tanam wijen : 30 cm x 25 cm, dan 40 cm x 25 cm. Di samping itu juga terdapat perlakuan monokultur kapas dan wijen. Hasil penelitian menunjukkan bahwa perbedaan jarak tanam kapas dan wijen baik dalam pola monokultur maupun tumpangsari berpengaruh terhadap jumlah cabang generatif, jumlah buah, produksi serat kapas berbiji, tinggi tanaman, jumlah polong, dan produksi kering wijen. Produksi serat kapas berbiji dan produksi wijen kering lebih tinggi pada pola monokultur dibanding pola tumpangsari. Produksi serat kapas berbiji tertinggi 1 540 kg/ha dengan jarak tanam 100 cm x 25 cm, sedang produksi wijen tertinggi 708.03 kg/ha dengan jarak tanam 30 cm x 25 cm, keduanya pada pola monokultur. Namun demikian, pendapatan bersih petani lebih tinggi pada pola tumpangsari dibandingkan dengan monokultur. Pendapatan usahatani tertinggi Rp. 1 011 000 dicapai pada kombinasi jarak tanam kapas 125 cm x 25 cm dan wijen 40 cm x 25 cm, dengan Nilai Setara Laban (NSL) 1.50.

Kata kunci : *Gossipium hirsutum, Sesamum indicum* Jarak tanam, lahan kering, nilai setara lahan, pendapatan, tumpangsari.

INTRODUCTION

The cultivation of several annual crops under single cropping system will narrow the units of the farming. As a result the level of land productivity and farmer's income per unit area is low. One of the efforts to overcome this problem is to apply intercropping systems (SAHID *et al.*, 1994).

The intercropping of cotton with pulses or with other annual crops actually increases the income of the farmer. Besides that, intercropping systems can also lessen the risk of harvest failure. If one of the crops fails due to climate, pests or diseases, it is expected that there are still other crops which produce yield. Moreover, drought resistance was one of the factors considered in formulating the cropping pattern, so that limited natural resources can be utilized maximally (SOENARDI and ROMLI, 1994). Research on intercropping cotton with pulses, both on dry land and rice field had been frequently conducted. The result was very useful to the farmers, it increased ratio equivalent of land and income (TANDISAU *et al.*, 1989; NAPU *et al.*, 1990). However, intercropping of cotton and sesame has not been adopted yet, though sesame has potential for intercropping system (SOENARDI and ROMLI, 1994).

Plant density of an area is closely related to plant population, further it will influence the production. The choice of plant density depends on cropping pattern and condition of the planting area. Cotton plant spacing of 100 cm x 20 cm under intercropping system with soybean gave good production (NAPPU *et al.*, 1990). While the highest sesame yield was obtained from single cropping with a plant spacing of 30-40 cm x 20 cm (KADIR *et al.*, 1992).

The objective of the research was to evaluate out the growth and the yield of cotton and sesame grown under intercropping using different plant spacings of cotton and sesame.

MATERIALS AND METHOD

The research was conducted in the experimental garden of the Bajeng Sub Research Institute for Tobacco and Fibre Crops, type of climate C_2 (OLDEMAN and DARMIYATI, 1977). The research activities were carried out from March to August 1994. The experiment used randomized block design with three replications. The treatments are presented in Table 1.

After the soil was prepared thoroughly, the experimental plots were prepared with a plot size of 6 m x 5 m, distance between plots was 1.5 m, distance between replications 2.0 m, later on the soil was applied with Furadan 3 G 40 kg/ha, then ploughed so that it was mixed evenly.

The cotton seeds (variety Kanesia-2) were sown 3-4 seeds/hole, with the plant spacings according to the treatments. Sesame (variety Australia) was planted seven days after cotton Sesame seed were sown seven seeds/hole with the plant spacings according to the treatments. The sesame rows were placed between the cotton rows. The cotton and sesame seedlings were left two seedlings/hole.

Fertilizer on cotton was applied two times, the first application at planting time with a dosage of 50 kg KCl + 50 kg AS + 100 kg TSP per ha,

Table 1. Plant spacing of intercropping cotton and sesame
Tabel 1. *Perlakuan jarak tanam pada pola tumpangsari kapas dan wijen*

Treatment *Perlakuan*	Plant spacing	
	Cotton (cm) *Kapas*	Sesame (cm) *Wijen*
1	100 x 25	-
2	125 x 25	-
3	150 x 25	-
4	-	30 x 25
5	-	40 x 25
6	100 x 25	30 x 25
7	100 x 25	40 x 25
8	125 x 25	30 x 25
9	125 x 25	40 x 25
10	150 x 25	30 x 25
11	150 x 25	40 x 25

Note : 1-3 single cropping cotton
4-5 single cropping sesame
6-11 intercropping cotton with sesame

Keterangan :
1-3 Kapas monokultur
4-5 Wijen monokultur
6-11 Tumpangsari kapas dengan wijen

the second application was 42 days after planting with a dosage of 100 kg urea/ha. Sesame was fertilized with urea 50 kg/ha, 30 days after planting.

Crop maintenance covered replanting, thinning, weeding, soil rising, and pest control by using Thiodan 35 EC and Sevin 85 S at a dosage of 1.5 liter and 2 kg/ha per application respectively were used for pest control.

The observation on cotton plants covered plant height at the age of 120 days after planting, number of vegetative and generative brunches, canopy width, number of bolls, weight of 100 bolls, and seed cotton yield. While the observation on sesame plants covered plant height, height of first capsules from the foot stem, number of capsules per clump, weight of seeds/100 pods, yield of dry seeds/plot, and analysis of income.

The statistical analysis of parameters on cotton was conducted only on treatment 1,2,3,6,7, 8,9,10 and 11 (9 treatments). While on sesame the

analysis was conducted to compare treatment 4,5, 6,7,8,9,10 and 11 (8 treatments). Orthogonal comparison analysis was used to find out the effect of plant spacing and intercropping system.

RESULTS AND DISCUSSION

Cotton growth components

The result of the analysis on plant height, number of vegetative branches, and canopy width of cotton indicated that the treatments did not significantly affect the parameters, both on cotton under single cropping system and on intercropping cotton with sesame. Significant effect occured on the number of generative branches (Table 2). Table 2 shows that the plant spacing of 100 cm x 25 cm under single cropping cotton tend to produce more generative branches (18.47) compared with other treatments and it was significantly different from that of intercropping cotton with plant spacing of 100 cm x 25 cm and 125 cm x 25 cm.

Orthogonal comparison analysis indicated that, in general, the distance between rows did not influence the number of generative branches. However, the number of generative branches is higher in single cropping system with the row distances 100 cm and 125 cm, respectively 18.47 and 16.3 compared to the intercropping system with plant spacing of 100 cm x 25 cm for cotton-30 cm x 25 cm for sesame, and 100 cm x 25 cm for cotton 40 cm x 25 cm for sesame.

Table 2. Growth components of cotton under single and intercropping systems
Table 2. Rataan komponen pertumbuhan kapas dalam pola tanam tunggal dan tumpangsari dengan wijen

Treatments *Perlakuan*	Plant spacing *Jarak tanam*		Plant hight (dap) *Tinggi tanaman (Hst)*			Number of branches *Jumlah cabang*		
	Cotton *Kapas* (cm)	Sesame *Wijen* (cm)	60 (cm)	90 (cm)	120 (cm)	Vegetative *Vegetatif*	Generative *Generatif*	Canopy width *Lebar konopi* (cm)
1	100 x 25	-	66.33^{a}	101.17^{a}	109.90^{a}	1.20^{a}	18.47^{a}	56.27^{a}
2	125 x 25	-	60.70^{a}	94.27^{a}	104.27^{a}	1.53^{a}	16.13^{abc}	51.70^{a}
3	150 x 25	-	63.20^{a}	101.47^{a}	110.63^{a}	1.77^{a}	16.83^{ab}	59.07^{a}
4	-	30 x 25	-	-	-	-	-	-
5	-	40 x 25	-	-	-	-	-	-
6	100 x 25	30 x 25	64.23^{a}	89.83^{a}	100.93^{a}	1.70^{a}	11.83^{d}	45.67^{a}
7	100 x 25	40 x 25	62.30^{a}	89.00^{a}	95.30^{a}	1.77^{a}	12.10^{d}	44.20^{a}
8	125 x 25	30 x 25	68.83^{a}	97.67^{a}	106.23^{a}	1.87^{a}	12.87^{cd}	54.93^{a}
9	125 x 25	40 x 25	65.60^{a}	94.67^{a}	103.67^{a}	1.67^{a}	13.13^{cd}	51.77^{a}
10	150 x 25	30 x 25	62.63^{a}	90.90^{a}	102.43^{a}	1.53^{a}	15.10^{a-d}	48.00^{a}
11	150 x 25	40 x 25	65.97^{a}	90.77^{a}	102.50^{a}	1.73^{a}	14.70^{abc}	48.70^{a}
CV. *KK.* (%)			10.1	6.6	5.1	18.2	12.9	11.9

Note : 1-3 single cropping cotton;
4-5 single cropping sesame
6-10 intercroping cotton with sesame
Number in the same column followed by the same letter is not significantly different according to DMRT p = 0.05.

Keterangan :
1-3 Kapas monokultur
4-5 wijen monokultur
6-10 tumpangsari kapas dengan wijen
Angka-angka yang diikuti huruf sama pada kolom yang sama, tidak berbeda nyata menurut uji DMRT 0.05.

With a row distance of 150 cm, there was no difference in the number of generative branches both under single cropping and intercropping systems (Table 2). This condition showed that the sesame grown in between the cotton plants became competitors in utilizing the growth factors, particularly in the plant spacing of 100 cm and 125 cm. Generally, the rate of the plant growth under intercropping system was inhibited because of the competition in utilizing sunlight, soil nutrients, and water. GUINN (1976) explained that one of the inhibiting factors of plant growth and production was sunlight, nutrition, and water competition, both within-species and between species. Moreover, the lower and the middle leaves of the crowded plants could not perform photosynthesis completely because their canopies covered each other, so that it influenced the result of the net photosynthesis. Lastly, the competition influenced the plant growth. THARP (1960) stated that limitation in sunlight absorption in the narrow plant spacing reduced the number of vegetative and generative branches, and the plants became dwarf.

Yield components and yield of seed cotton

Different cotton plant spacings under single cropping system and under intercropping with sesame affected the number of bolls and the yield of seed cotton. While their effect on the weight of 100 bolls was not significant (Table 3).

Table 3 and Table 4 show that densed population (narrow plant spacing) tended to increase the cotton yield. It was estimated that, although the growth and the productivity of individual plants in narrow plant spacing decreased, the cotton yield per unit area was high because the cotton population was higher.

Table 3. Yield component and yield of cotton under intercropping with sesame.
Tabel 3. Komponen hasil dan hasil kapas dalam tumpangsari dengan wijen

Treatment	Plant spacing *Jarak tanam*		Number of bolls *Jumlah buah*	Weight of 100 bolls *Bobot 100 buah* (g)	Yield of seed cotton *Hasil kapas berbiji* (ton/ha)
	Cotton *Kapas* (cm)	Sesame *Wijen* (cm)			
1	100 x 25	-	18.60[a]	45.30[a]	1.54[c]
2	125 x 25	-	17.43[abc]	47.40[a]	1.47[bc]
3	150 x 25	-	17.73[ab]	47.20[a]	1.40[bc]
4	-	30 x 25	-	-	-
5	-	40 x 25	-	-	-
6	100 x 25	30 x 25	14.70[bc]	45.07[a]	1.36[b]
7	100 x 25	40 x 25	14.40[c]	46.93[a]	1.43[bc]
8	125 x 25	30 x 25	14.93[bc]	47.00[a]	1.32[b]
9	125 x 25	40 x 25	15.67[abc]	44.57[a]	1.34[b]
10	150 x 25	30 x 25	17.10[abc]	48.20[a]	1.09[a]
11	150 x 25	40 x 25	10.33[a]	47.37[a]	1.03[a]
CV. *KK.* (%)			10.1	6.6	5

Note : 1-3 single cropping cotton;
4-5 single cropping sesame
6-10 intercroping cotton with sesame
Number in the same column followed by the same letter is not significantly different according to DMRT p = 0.05.

Keterangan :
1-3 Kapas monokultur
4-5 wijen monokultur
6-10 tumpangsari kapas dengan wijen
Angka-angka yang diikuti huruf sama pada kolom yang sama, tidak berbeda nyata menurut uji DMRT 0.05.

Table 4. Effect of plant spacings under intercropping cotton with sesame on cotton growth and yield
Tabel 4. Pengaruh jarak tanam dalam tumpangsari kapas+wijen terhadap pertumbuhan dan hasil kapas

Treatment comparison *Perbandingan perlakuan*		F. calculated *F. hitung*		
		Number of generative branches *Jumlah cabang generatif*	Number of bolls *Jumlah Buah*	Yield of seed cotton *Hasil kapas berbiji*
1,6,7 Vs 2,8,9 3,10,11	Effect of cotton plant spacing *Pengaruh jarak tanam kapas*	0.75^{ns}	2.12^{ns}	24.34**
1 vs 6,7	Effect of sesame on the plant spacing of cotton 100cmx25cm *Pengaruh wijen pada jarak tanam kapas*	24.32**	12.40**	5.76**
2 vs 8,9	Effect of sesame on the plant spacing of cotton 125cmx125cm *Pengaruh wijen pada jarak tanam kapas*	5.67*	3.44^{ns}	5.12*
3 vs 10,11	Effect of sesame on the plant spacing of cotton 150cmx25cm *Pengaruh wijen pada jarak tanam kapas*	2.15^{ns}	ns	29.95**
6 vs 7	Effect of plant spacing of sesame on the plant spacing of cotton 100cmx25cm *Pengaruh jarak tanam wijen pada jarak tanam kapas 100cm x 25cm*	ns	ns	ns
8 vs 9	Effect of plant spacing of sesame on the plant spacing of cotton 125cmx25cm *Pengaruh jarak tanam wijen pada jarak tanam kapas 125cm x 25cm*	ns	ns	
10 vs 11	Effect of plant spacing of sesame on the spacing of cotton 150cmx25cm *Pengaruh jarak tanam wijen pada jarak tanam kapas 150cm x 25cm*	ns	2.28^{ns}	0.75^{ns}

Note : ns = not significant *tidak nyata*
Keterangan : * = significant at p = 0.05 *nyata pada p 0.05*
** = significant at p = 0.01 *nyata pada p 0.05*
1 - 11 = treatment codes *kode perlakuan*

Moreover, Table 4 indicates that the effect of sesame plants grown between the cotton plants was different according to the cotton plant spacing, while the sesame plant spacing did not give any effect. Under the cotton plant spacing of 100 cm x 25 cm the number of bolls decreased from 18.60 (treatment 1) to 14.70 (treatment 6) and 14.40 (treatment 7), and also tended to reduce the yield of seed cotton from 1.54 ton/ha to 1.36 and 1.43/ha.

Table 5. Growth components, yield components, and yield of sesame on intercropping of cotton + sesame
Tabel 5. Komponen pertumbuhan, komponen hasil wijen, dan hasil dalam pola tumpangsari kapas + wijen

Treatment *Perlakakuan*	Plant spacing *Jarak tanam*		Heigth *Tinggi*		Number of capsules *Jumlah polong*	Weigth of seeds *Bobot biji* (g/1000 seeds *(biji)*	Dry yield *Hasil wijen kering* (kg/ha)
	Cotton *Kapas* (cm)	Sesame *Wijen* (cm)	Plant *Tanaman* (cm)	First capsules *Polong I* (cm)			
1	100 x 25	-	-	-	-	-	-
2	125 x 25	-	-	-	-	-	-
3	150 x 25	-	-	-	-	-	-
4	-	30 x 25	112.50[b]	33.57[a]	43.47[a]	3.43[a]	708.03[c]
5	-	40 x 25	116.20[b]	32.23[a]	43.10[a]	3.46[a]	661.00[c]
6	100 x 25	30 x 25	97.37[a]	38.73[a]	41.20[a]	3.53[a]	435.53[b]
7	100 x 25	40 x 25	98.53[a]	39.59[a]	22.80[a]	3.68[a]	292.73[a]
8	125 x 25	38 x 25	108.47[b]	39.70[a]	22.93[a]	3.47[a]	322.88[ab]
9	125 x 25	40 x 25	111.07[b]	35.53[a]	31.37[ab]	3.50[a]	386.55[ab]
10	150 x 25	30 x 25	113.23[b]	38.23[a]	41.00[a]	3.40[a]	364.33[ab]
11	150 x 25	40 x 25	117.20[b]	35.00[a]	31.57[ab]	3.43[a]	320.80[ab]
CV. *KK* (%)			4.5	10.2	8.0	2.1	

Note : 1-3 single cropping cotton
4-5 single cropping sesame
6-11 intercropping cotton with sesame
Number in the column followed by the same letter is not significantly different according to DMRT 0.05

Keterangan :
1-3 kapas monokultur
4-5 wijen monokultur
6-11 kapas tumpangsari dengan wijen
Angka-angka yang diikuti huruf yang sama pada kolom yang sama tidak berbeda nyata menurut uji DMRT 0.05

The cotton plant spacing of 125 cm x 25 cm and 150 cm x 25 cm did not reduce the number of bolls, however, the sesame reduced the yield of seed cotton (treatment 2 vs 8,9; treatment 3 vs 10,11).

The population density of cotton under the plant spacing of 100 cm x 25 cm of intercropping with sesame increased the individual competition in absorbing sunlight, soil nutrients, water and other growth factors. This condition inhibited the growth of the plants which further affected the production. According to HARJADI (1979) to produce high yield needed a balance between vegetative phase and reproductive phase. The balance was strongly influenced by the enviromental factors, such as temperature, the length of the day, and population density (ARNON, 1972).

Growth, yield components and yield of sesame

The result of the analyses showed that the treatments did not influence the height of first capsules and the weight of 1,000 sesame seeds. The effect of the treatment was seen on the height of plant, the number of capsules, and the yield of dry seed (Table 5). The data indicated that the sesame productivity tended to decrease when it was planted under intercropping system. It could be seen from the smaller number of capsules and lower sesame yield under the intercropping system compared with those under single cropping system (treatment 4,5 vs 6,7,8,9,10,11).

Furthermore, the cotton plant spacing under intercropping system influenced the sesame growth and yield. The narrower distance between

Table 6. Effect of cotton spacing under intercropping of cotton with sesame on the growth and yield of sesame
Tabel 6. Pengaruh jarak tanam dalam tumpangsari kapas+wijen terhadap pertumbuhan dan hasil wijen

Treatment comparison *Perbandingan perlakuan*		F calculated *F hitung*		
		Plant height *Tinggi tanaman*	Number of capsules *Jumlah polong*	Seed yield *Hasil biji*
4,5 Vs 6,7,8,9,10,11	Effect of intercropping *Pengaruh tumpangsari*	8.34**	15.23**	124.45**
6,7 Vs 8,9,10,11	Effect of cotton plant spacing *Pengaruh jarak tanam kapas*	34.81**	18.52**	5.03*
4,6,8,10 Vs 5,7,9,11	Effect of sesame plant spacing *Pengaruh jarak tanam wijen*	2.69ns	5.02*	0.45ns

Note : ns = not significant *tidak nyata*
Keterangan : * = significant at p = 0.05 *nyata pada p = 0.05*
** = significant at p = 0.01 *nyata pada p = 0.01*

the cotton rows, the plant height, number of capsules, and yield of sesame tended to decrease. The sesame plants, with plant spacing of 30 cm x 25 cm and 90 cm x 25 cm grown in bet- ween the cotton rows of 100 cm x 25 cm, could only reach a plant height of 97.37 cm and 98.53 cm, number of capsules 22.93 and 22.80, and a yield of 320.80 and 292.73 kg/ha. This was lower compared with those of other treatments (Table 6). Table 6 shows that the sesame plant spacing influenced the number of capsules, the capsule yield tended to increase on the plant spacing of 30 cm x 25 cm (treatment 4,6,8,10 vs 5,7,9,11).

This condition showed that the population density influenced the absorption of water, soil nutrients, and sunlight interception because the plant canopies covered one another so that the photosyntesis process did not work maximally, which finally resulted in a negative effect on the growth and the production of the plants.

Analyses of income and ratio equivalent to land

The analyses of income for each treatments were conducted using the differences between the total yield value and the total production cost. The components of investment included the purchase of seeds, fertilizers, and insecticide. While the costs for soil preparation and maintenance conducted by the farmer family were not included in the investment component.

The combination of cotton plant spacing 125 cm x 25 cm and sesame plant spacing 40 cm x 25 cm gave the highest farm income amongst the treatments (Rp 1,011,000). This indicates that the productivity level of each commodity decreased under intercropping system, but the effectiveness of land utilization increased so that the total farm productivity was higher (BEETS, 1982).

The yield of single cropping sesame at farmer level in Ngawi, East Java was about 100 kg/ha, while the yield of sesame under intercropping with cassava could reach 1,000 kg/ha.

Moreover, the maximum yield of single cropping cotton at farmer level reached 700 kg/ha, while the yield of cotton under intercropping with mungbean could reach 400 kg/ha (ANON., 1982), meaning that the yield of cotton decreased by 42 %. In this research, the cotton plant spacing 125 cm x 25 cm under single cropping cotton produced seed cotton of 1,470 kg/ha, and inter cropping cotton with sesame produced seed cotton of 1,340 kg/ha.

Table 7. Economic analyses of farm income under various cropping pattern of cotton and sesame
Tabel 7. Analisis usahatani pola tanam kapas dan wijen

No	Plant spacing *Jarak tanam*		Yield *Hasil*		Yield value *Nilai hasil*		Total value *Nilai*	Production cost *Biaya produksi*		Total *Jumlah*	Net income *Pendapatan bersih*	LER *NSL*
	Cotton *Kapas*	Sesame *Wijen*	Cotton *Kapas*	Sesame *Wijen*	Cotton *Kapas*	Sesame *Wijen*		Cotton *Kapas*	Sesame *Wijen*			
	------- cm -------		---- ton/ha ----		---------- 1000 rp ----------							
1	100 x 25	-	1.54	-	1078	-	1078.0	-	281.0	281.0	797.0	1.00
2	125 x 25	-	1.47	-	1029	-	1029.0	268.5	-	268.5	760.5	1.00
3	150 x 25	-	1.40	-	980	-	980.0	256.0	-	256.0	724.0	1.00
4	-	30 x 25	-	0.708	-	778.8	778.8	-	88.1	88.1	690.7	1.00
5	-	40 x 25	-	0.661	-	727.1	727.1	-	85.5	85.5	641.6	1.00
6	100 x 25	30 x 25	1.36	0.321	952	352.0	1304.0	281.0	84.4	365.4	936.6	1.33
7	100 x 25	40 x 25	1.43	0.293	1001	321.2	1322.1	281.0	84.1	365.1	957.0	1.37
8	125 x 25	30 x 25	1.32	0.323	924	354.2	1278.2	268.5	83.3	351.8	926.4	1.36
9	125 x 25	40 x 25	1.34	0.387	938	424.6	1362.6	268.5	83.1	351.6	1011.0	1.50
10	150 x 25	30 x 25	1.09	0.364	763	400.6	1163.4	256.0	82.5	338.5	824.9	1.29
11	150 x 25	40 x 25	1.03	0.436	721	478.5	1199.5	256.0	82.4	338.4	861.1	1.40

Note : 1-3 single cropping cotton *kapas monokultur*
Keterangan : 4-5 single cropping *sesame wijen monokultur*
6-11 intercropping cotton with sesame *kapas tumpangsari dengan wijen*

CONCLUSION

Cotton and sesame plant spacings both under single and intercropping systems affected the number of generative branches, number of bolls and yield of seed cotton, and also the plant height, number of capsules, and the yield of dry sesame seeds.

The highest yield seed cotton and sesame were obtained respectively from single cropping cotton a with plant spacing of 100 cm x 25 cm and single cropping sesame with a plant spacing of 30 cm x 25 cm, i.e. 1.54 ton/ha and 708.03 kg/ha.

The yields of each crop decreased under intercropping system, but the net income of the farmers was higher compared with that of single cropping system. The highest income was obtained from intercropping cotton with sesame under cotton plant spacing of 125 cm x 25 cm and sesame plant spacing of 40 cm x 25 cm with land equivalent ratio (LER) of 1.50.

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