

5. Effect of Duration of Weed Removal on Growth and Yield of Mungbean and Soybean (1979)

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The experiment was carried out to determine the extent and duration of weed competition when mungbean and soybean are grown under different irrigation conditions.

Materials and Method

1. Varieties:
Mungbean: SPR 1
Soybean: SJ 4
2. Treatment:
 - 1) Irrigation:
By adjusting the irrigation interval, the following treatments (high and low) were carried out.

	High		Low	
	Mungbean	Soybean	Mungbean	Soybean
Irrigation time	8	12	4	6
Irrigation rate (mm/day)	4.9—5.9	5.0—6.3	3.7—3.9	3.7—4.6
Total amount of irrigation (mm)	377	570	264	417

- 2) Duration of weed removal (as indicated in terms of weeks after planting and frequency of weeding):
 - Non-removal
 - 2 weeks (once)
 - 4 weeks (twice)
 - 6 weeks (3 times)
 - 8 weeks (4 times)
3. Experimental layout and plot size:
Split plot design with 4 replications was applied disposing irrigation treatment as the main plot and duration of weed removal as the subplot. The size of subplot was 24 m² (8 m × 3 m).
4. Seeding time: February 7, 1979
5. Fertilizer: N: 20, P₂O₅: 50, K₂O: 50 (Kg/ha)
6. Spacing: 75 cm × 20 cm, 2 plants/hill
7. Pest control: Monocrotophos (Azodrin) in water solution with 0.1 percent active ingredient was sprayed 7 times from February 19 to April 18.

Result

1. The fluctuation of the soil moisture tension in the field is shown in Fig.5-1. The low irrigation plot was exposed to drought for longer period than the high irrigation plot. Under this condition, the plants in the low irrigation plot matured earlier than the other plot (by 2 to 3 days earlier in case of mungbean; and 4 to 7 days in

soybean). On the other hand, the effect of duration of weed removal on crop phenology was not so remarkable as that of the irrigation treatment, but the maturity of both the crops was delayed a few days as the duration of weed removal was longer.

2. The plant characteristics such as, 1) stem height and thickenss, and 2) number of branches and nodes, of the high irrigation plot of both the crops were definitely superior to those of the low irrigation plot. On the other hand, the differentiation among the weed removal treatments was slight in both the crops although all characteristics of the weed non-removal plot exhibited lower values than those of weed removal plots.
3. Out of plant characteristics related to yield components, number of pods per hill and 100 seed weight were significantly higher in the high irrigation plot than the low one in both the crops. Concerning the weed removal treatments, differences also appeared in the aforementioned two and another characteristics (number of seeds per pod) between the plots of weed non-removal and removal for 6 or 8 weeks but the differences were not always significant (Table 5-1 and 2).
4. The weight of normal seeds was significantly higher in the high irrigation plot than the low one for both the crops. The seed weight was also significantly higher in the weed removal plots than the non-removal plots for both the crops; there was a trend toward higher seed weight as the duration of weed removal was extended. However, there were not significant differences among the plots in the duration of weed removal; i.e. 4, 6 and 8 weeks in mungbean, and 6 and 8 weeks in soybean (Table 5-3 and 4, Fig. 5-2). Interaction between the irrigation amount and the duration of weed removal for the weight of normal seed was not significant.
5. The weight of injured seeds which were mainly caused by insect pests exceeded 30% of total seed weight in case of soybean while only a few percent in mungbean. There was no relationship between the percentage of injured seeds and the duration of weed removal.
6. There were a limited number of weed species in the experimental field; that is, common sedge (*Cyperus iria* L.), large crabgrass (*Digitaria adscendens* (HBK) Henr.), jungle rice (*Echinochloa colonum* (L.) Link), wild spider (*Cleome viscosa* L.), *Phaseolus lathyroides* L. and so on. Out of them, only the first 3 species were abundant in number; especially jungle rice occupied the majority in weight.
7. The dry weight of weeds per square meter is presented in Table 5-5. No significant difference was found between the plots of high and low irrigation level. In both the crops the amount of weeds decreased as the duration of weed removal was extended. It was noted that weeds began to grow again after the leaf yellowing period in case of soybean.

Discussion

Major weed species observed in the experimental plots were grassy ones, and broad-leaved species were very few in number. Since it was reported that grassy weeds were inferior to broad-leaved weeds in competition with soybean⁷⁾, the extnet of weed competition in this experiment might not be so severe as in the case broad-leaved weeds were more numerous.

The effect of increased frequency of irrigation in offseting yield reduction by weeds was very marked in both mungbean and soybean. For example, the yield in the plot of weed non-removal with high irrigation exceeded those of all weed removal treatments

with low irrigation. The results suggest that the impact of yield reduction by weeds in both the crops is less severe under appropriate soil moisture condition.

Determination of the length of the period during which weeds have to be removed is important in planning weed control. In this regard, this experiment clearly demonstrated that mungbean and soybean may require the weed-removing period of 4 and 6 weeks after planting, respectively.

References

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Table 5-1. Yield components of mungbean in relation to irrigation conditions and durations of weed removal

Duration of weed removal (no. of week after planting)	Number of pods (no./hill)			Number of seeds (no./pod)			100 seed weight (g)		
	Irrigation amount Low	Irrigation amount High	Mean	Irrigation amount Low	Irrigation amount High	Mean	Irrigation amount Low	Irrigation amount High	Mean
0	14.1	26.8	20.5	8.5	9.1	8.8	8.3	7.7	8.0
2	16.9	33.4	25.2	9.0	9.4	9.2	8.4	7.7	8.1
4	18.1	34.0	26.1	9.4	10.1	9.8	8.6	7.9	8.3
6	18.4	35.5	27.0	10.9	10.2	10.2	8.6	8.0	8.3
8	18.3	35.0	26.7	10.1	10.3	10.2	8.5	8.0	8.3
Mean	17.2	32.9		9.4	9.8		8.5	7.9	
L S D (5%)									
Between irrigation amount			4.7	N S			0.5		
Between duration of weed removal			5.2	1.2			0.3		
Between duration of weed removal of the same irrigation amount			7.4	1.7			0.4		

Table 5-2. Yield components of soybean in relation to irrigation conditions and durations of weed removal

Duration of weed removal (no. of week after planting)	Number of pods (no./hill)			Number of seeds (no./pod)			100 seed weight (g)		
	Irrigation amount Low	Irrigation amount High	Mean	Irrigation amount Low	Irrigation amount High	Mean	Irrigation amount Low	Irrigation amount High	Mean
0	70	154	112	2.0	1.9	2.0	15.0	15.5	15.3
2	94	186	140	1.9	1.9	1.9	15.1	16.3	15.7
4	112	192	152	1.9	1.8	1.9	15.1	16.9	16.0
6	121	197	159	1.9	1.8	1.9	15.6	17.0	16.3
8	124	196	160	1.9	1.8	1.9	15.5	17.2	16.4
Mean	104	185		1.9	1.8		15.3	16.6	

L S D (5%)

Between irrigation amount	37	N S	1.1
Between duration of weed removal	34	N S	0.7
Between duration of weed removal of the same irrigation amount	48	N S	1.0

Table 5-3. Mungbean yield in relation to irrigation conditions and durations of weed removal

Duration of weed removal (no. of week after planting)	Normal seed (ton/ha)			Injured seeds (ton/ha)			Total seeds (ton/ha)			Ratio of normal seeds to total seeds (%)	
	Irrigation amount Low	Irrigation amount High	Mean	Irrigation amount Low	Irrigation amount High	Mean	Irrigation amount Low	Irrigation amount High	Mean	Low ir.	High ir.
0	0.80	1.25	1.03	0.00	0.04	0.02	0.80	1.29	1.05	100	97
2	1.00	1.45	1.23	0.01	0.02	0.02	1.01	1.47	1.24	99	99
4	1.21	1.65	1.43	0.01	0.01	0.01	1.22	1.66	1.44	99	99
6	1.24	1.69	1.47	0.02	0.01	0.02	1.26	1.70	1.48	98	99
8	1.26	1.66	1.46	0.02	0.04	0.03	1.28	1.70	1.49	98	98
Mean	1.10	1.54		0.01	0.02		1.11	1.56		99	98

L S D (5%)

Between irrigation amount	0.10	N S	0.09
Between duration of weed removal	0.21	N S	0.21
Between duration of weed removal of the same irrigation amount	0.30	N S	0.30

Remarks: Figures are based on 13% moisture content.

Table 5-4. Soybean yield in relation to irrigation conditions and durations of weed removal

Duration of weed removal (no. of week after planting)	Normal seed (ton/ha) Irrigation amount			Injured seeds (ton/ha) Irrigation amount			Total seeds (ton/ha) Irrigation amount			Ratio of normal seeds to total seeds (%)	
	Low	High	Mean	Low	High	Mean	Low	High	Mean	Low ir.	High ir.
0	0.50	1.11	0.81	0.27	0.53	0.40	0.77	1.64	1.21	65	68
2	0.76	1.39	1.08	0.39	0.66	0.53	1.15	2.05	1.60	66	68
4	0.84	1.47	1.16	0.44	0.72	0.58	1.28	2.19	1.74	66	67
6	0.99	1.62	1.31	0.53	0.78	0.66	1.52	2.40	1.96	65	68
8	1.03	1.61	1.32	0.53	0.77	0.65	1.56	2.38	1.97	66	68
Mean	0.82	1.44		0.43	0.69		1.26	2.13		66	68

L S D (5%)

Between irrigation amount	0.44	0.23	0.67
Between duration of weed removal	0.23	0.11	0.34
Between duration of weed removal of the same irrigation amount	0.31	0.16	0.48

Remarks: Figures are based on 13% moisture content.

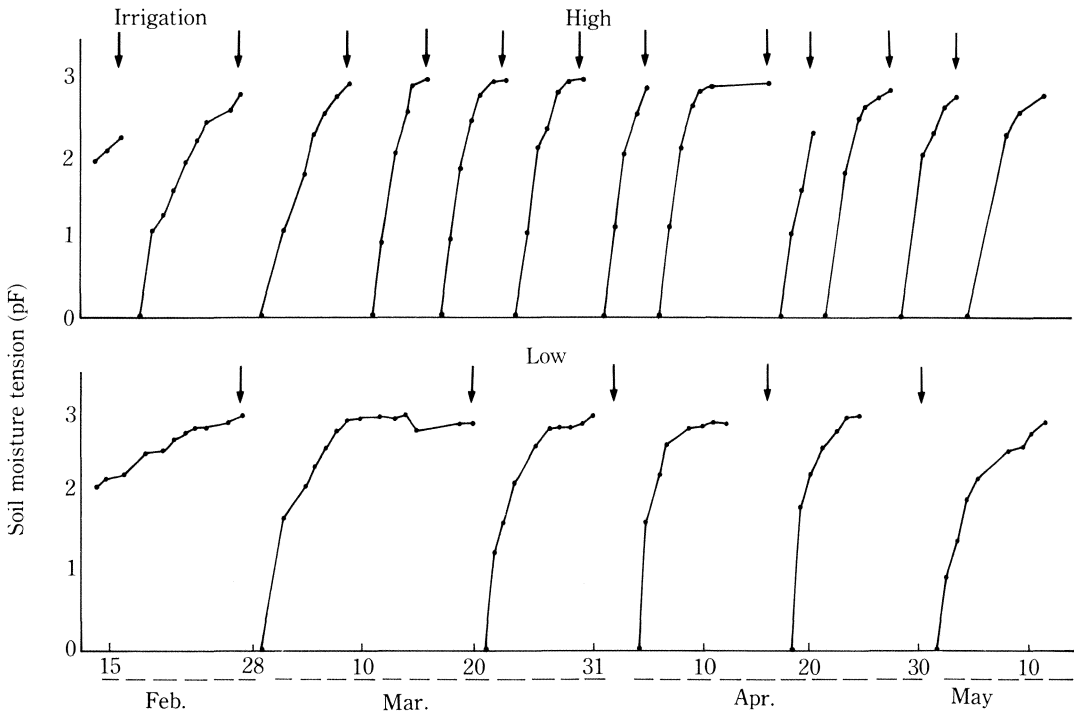
Table 5-5. Dry weight of weeds at crop harvest in relation to irrigation conditions and durations of weed removal

Duration of weed removal (no. of week after planting)	Mungbean (g/m ²)			Soybean (g/m ²)		
	Irrigation amount Low	Irrigation amount High	Mean	Irrigation amount Low	Irrigation amount High	Mean
0	186	208	197	231	245	238
2	150	122	136	196	165	181
4	46	46	46	147	99	123
6	31	21	26	99	43	71
8	15	4	10	57	11	34
Mean	86	80		146	115	

L S D (5%)

Between irrigation amount	N S	N S
Between duration of weed removal	27	46
Between duration of weed removal of the same irrigation amount	37	65

Remarks: Sampling date: mungbean April 20, soyben May 15



Remarks: Soil moisture tension was recorded at the depth of 20 cm from the top of ridges in the mungbean field

Fig. 5-1. Successive changes of soil moisture tension in plots with low and high irrigation

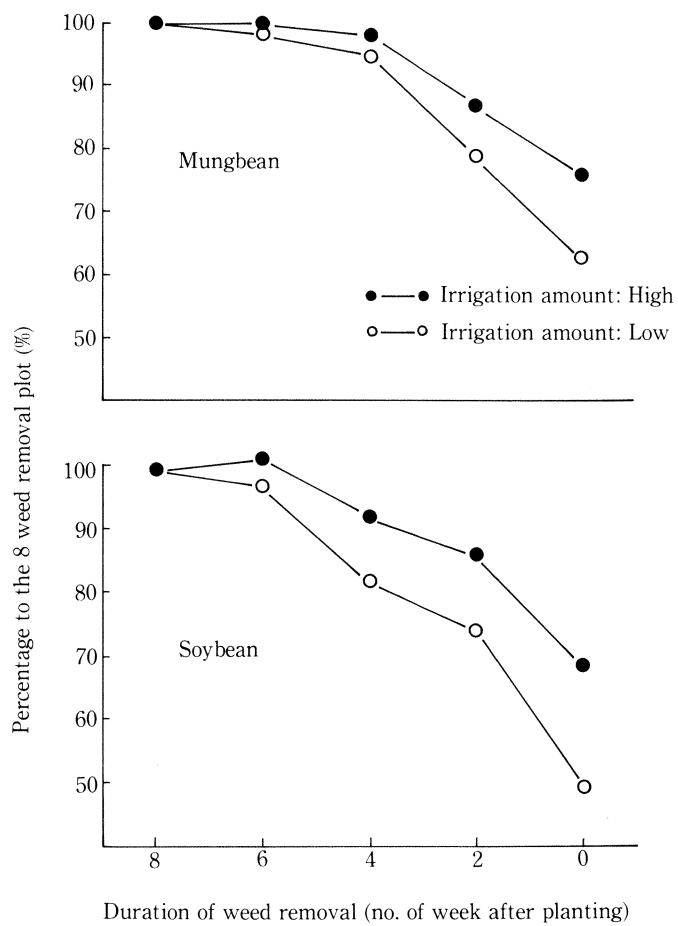


Fig. 5-2. Relationship between yield reduction and durations of weed removal