Table 4: Effect of sowing dates, hill spacing and NPK fertilization on growth, carbohydrates % and yield & yield components of cotton in 2010 and 2011 seasons

Treatments		Growth traits						Carbohydrates		Yield and yield components					
		Plant height at harvest		No. of fruiting branches /pl		First fruiting node				No. of open bolls/pl		Boll weight (g)		Seed cotton yield (ken./fed)	
		2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
Planting dates	First date	128.39	128.75	15.31	15.53	5.25	5.13	51.05	52.46	13.92	17.20	2.32	2.39	7.33	10.69
	Second date	146.92	134.14	13.44	10.67	6.11	6.83	32.38	33.18	10.83	13.07	2.24	2.24	6.17	8.07
	Third date	156.36	162.92	10.20	9.74	8.25	7.94	12.84	12.94	8.62	10.62	2.02	1.93	3.83	6.02
LSD at 0.05		**0.40**	**0.50**	**0.34**	**0.34**	**0.27**	**0.14**	**0.36**	**0.42**	**0.24**	**0.06**	**0.05**	**0.19**	**0.06**	**0.05**
Hill spacing	15 cm	155.81	150.78	12.30	10.89	7.08	7.27	28.87	29.62	8.53	11.61	2.07	1.97	4.80	7.37
	20 cm	143.89	143.75	12.98	11.72	6.61	6.53	31.87	31.92	11.50	13.48	2.18	2.17	5.91	8.37
	25 cm	131.97	131.28	13.67	13.32	5.92	6.10	35.53	37.04	13.34	15.80	2.32	2.41	6.61	9.03
LSD at 0.05		**0.40**	**0.50**	**0.34**	**0.34**	**0.27**	**0.14**	**0.36**	**0.42**	**0.24**	**0.06**	**0.05**	**0.19**	**0.06**	**0.05**
NPK %	100 %	144.89	141.78	12.90	12.07	6.50	6.60	31.95	32.17	11.05	13.64	2.17	2.18	5.70	8.19
	125 %	147.81	144.53	13.35	12.57	6.75	6.42	33.78	34.78	12.05	14.50	2.30	2.24	6.59	8.73
	75 %	138.97	139.50	12.70	11.29	6.36	6.89	30.53	31.63	10.27	12.75	2.11	2.14	5.03	7.86
LSD at 0.05		**0.64**	**0.48**	**0.27**	**0.27**	**0.23**	**0.20**	**0.43**	**0.28**	**0.27**	**0.05**	**0.04**	**0.02**	**0.07**	**0.06**

Results also in Table 4 showed that with increasing NPK rates to 125% of the recommended doses compared with another rates 100% and 75 % NPK increased growth, carbohydrates, yield and its components in the two seasons under study. These results may be due to the well known roles of N in building up the plant tissues and stimulating its growth. In this concern Hamed (2006) found that number of fruiting branches/plant, number of open bolls/plant and seed cotton yield/fed. significantly increased by increasing fertilizer levels up to75kg N+30kg P_2O_5+48kg K_2O/fed this response was due to the low levels of NPK in the experimental soil (Table 1) . However, location of first fruiting node was not affected by NPK fertilizer treatments

Table 5: Effect of the interaction between sowing date and hill spacing on growth, carbohydrates %, yield and yield components of cotton in 2010 and 2011 seasons

Treatments		Growth traits						Carbohydrates		Yield and yield components					
Planting dates	Hill spacing	Plant height at harvest		No. of fruiting branches /pl		First fruiting node				No. of open bolls/pl		Boll weight (g)		Seed cotton yield (ken./fed)	
		2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
1st March	15 cm	137.33	136.75	14.8	13.50	5.50	5.52	46.50	48.49	10.87	14.48	2.16	2.18	6.09	9.48
	20 cm	126.50	128.92	15.4	15.17	5.25	5.06	51.01	51.43	14.49	17.55	2.30	2.36	7.66	11.07
	25 cm	121.33	120.58	15.8	17.92	5.00	4.81	55.63	57.45	16.40	19.57	2.50	2.63	8.23	11.52
1st April	15 cm	160.67	142.50	12.3	10.17	6.83	7.48	28.11	29.09	8.07	11.60	2.09	2.01	5.08	7.27
	20 cm	149.25	135.25	13.4	10.00	6.17	6.71	32.22	32.23	11.20	12.31	2.24	2.23	6.47	8.14
	25 cm	130.83	124.67	14.6	11.83	5.33	6.31	36.82	38.21	13.21	15.30	2.37	2.48	6.95	8.80
1st May	15 cm	169.42	173.08	9.8	9.00	8.92	8.81	11.99	11.27	6.65	8.75	1.97	1.72	3.25	5.38
	20 cm	155.92	167.08	10.1	10.00	8.42	7.83	12.39	12.09	8.82	10.60	2.00	1.93	3.61	5.90
	25 cm	143.75	148.58	10.7	10.21	7.42	7.17	14.15	15.47	10.40	12.52	2.09	2.13	4.64	6.78
LSD at 0.05		0.69	0.86	0.58	0.58	0.47	0.24	0.63	0.72	0.41	0.10	0.08	0.03	0.11	0.09

Results in Table 5 showed that the interaction between planting date and hill spacing was significant with regard to plant height, number of fruiting branches/plant, first fruiting node, carbohydrates, number of open bolls per plant, boll weight and seed cotton yield/fed In the two seasons. Early planting on 1st march and hill spacing 25cm between hills gave the highest values for all growth, carbohydrates and yield compared with the other interactions in the two seasons.

Table 6: Effect of the interaction between sowing date and NPK % fertilization on growth, carbohydrates ,yield and yield components of cotton in 2010 and 2011 seasons

Treatments		Growth traits						Carbohydrates		Yield and yield components					
Sowing dates	NPK %	Plant height in cm at harvest		No. of fruiting branches /pl		First fruiting node				No. of open bolls/pl		Boll weight (g)		Seed cotton yield (ken./fed)	
		2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
1st March	100 %	129.58	128.17	15.16	15.58	5.25	5.10	51.23	52.50	13.91	16.67	2.31	2.44	7.24	10.47
	125 %	131.50	131.75	15.66	16.42	5.42	5.00	53.02	53.72	14.81	18.46	2.41	2.44	8.37	11.20
	75 %	124.08	126.33	15.11	14.58	5.08	5.29	48.90	51.15	13.04	16.46	2.25	2.29	6.37	10.40
1st April	100 %	148.75	134.33	13.35	10.71	6.17	6.85	31.88	31.49	10.84	13.61	2.22	2.18	6.14	8.10
	125 %	152.00	136.00	13.96	11.17	6.42	6.58	34.25	36.54	11.37	13.70	2.30	2.31	6.75	8.56
	75 %	140.00	132.08	13.00	10.13	5.75	7.06	31.02	31.50	10.27	11.89	2.19	2.23	5.61	7.54
1st May	100 %	156.33	162.83	10.19	9.92	8.08	7.83	12.74	12.52	8.40	10.63	1.97	1.91	3.72	6.00
	125 %	159.92	165.83	10.42	10.13	8.42	7.67	14.09	14.07	9.98	11.33	2.20	1.97	4.66	6.42
	75 %	152.83	160.08	10.00	9.17	8.25	8.31	11.69	12.24	7.50	9.91	1.89	1.89	3.12	5.63
LSD at 0.05		1.11	0.84	N.S	N.S	N.S	N.S	0.75	0.49	0.46	0.09	0.08	0.03	0.12	0.10

Results in Table 6 showed the interaction between planting date and NPK fertilizers was significant for plant height, number of open bolls per plant, boll weight and seed cotton yield/fed. This interaction revealed that the response of early cotton plant to NPK fertilizers surpassed the response of late ones. The hill spacing of 25cm between hills and 125% NPK fertilizers gave the highest values for plant height, carbohydrates , boll weight, number of bolls plant and seed cotton yield/fed. compared with the other rates in the two seasons.

Table 7: Effect of the interaction between hill spacing and NPK % on growth, carbohydrates and yield & yield components of cotton in 2010 and 2011 seasons

Treatments		Growth traits						Carbohydrates		Yield and yield components					
Hill spacing	NPK %	Plant height at harvest in cm		No. of fruiting branches /pl		First fruiting node				No. of open bolls/pl		Boll weight (g)		Seed cotton yield (ken./fed)	
		2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
15 cm	100 %	157.67	150.58	12.21	10.88	7.17	7.25	28.69	29.02	8.58	11.52	2.00	1.94	4.79	7.32
	125 %	160.75	153.42	12.67	11.55	7.17	7.08	30.33	31.83	8.88	12.26	2.24	2.00	5.33	7.97
	75 %	149.00	148.33	12.02	10.25	6.92	7.48	27.59	28.01	8.13	11.05	1.98	1.98	4.30	6.84
20 cm	100 %	143.58	143.67	12.85	11.92	6.50	6.54	31.63	30.70	11.01	13.62	2.19	2.19	5.68	8.36
	125 %	146.83	146.08	13.28	12.42	6.92	6.33	34.08	33.79	12.81	14.21	2.26	2.21	6.80	8.68
	75 %	141.25	141.50	12.82	10.83	6.42	6.73	29.90	31.25	10.68	12.61	2.10	2.11	5.26	8.07
25 cm	100 %	133.42	131.08	13.64	13.42	5.83	6.00	35.54	36.79	13.55	15.77	2.31	2.41	6.63	8.89
	125 %	135.83	134.08	14.09	13.75	6.17	5.83	36.94	38.71	14.47	17.02	2.40	2.50	7.64	9.54
	75 %	126.67	128.67	13.27	12.79	5.75	6.46	34.12	35.62	11.99	14.60	2.26	2.32	5.55	8.67
LSD at 0.05		1.11	0.84	N.S	N.S	N.S	N.S	N.S	0.49	0.46	0.09	0.08	0.03	0.12	0.10

Also, the data in Table 7 showed that the interactions between hill spacing and NPK fertilizers was significant on plant height, carbohydrates, number of open bolls per plant, boll weight and seed cotton yield/fed in the two seasons. Early planting on 1st march and 125% NPK fertilizers gave the highest values for carbohydrates , boll weight, number of bolls plants and seed cotton yield/fed. compared with the other interactions in the two seasons.

Table 8: Effect of the interaction between sowing date, hill spacing and NPK fertilizers on growth, carbohydrates , yield and yield components of cotton in 2010 and 2011 seasons

Treatments			Growth traits						Carbohydrates in mg/gm		Yield and yield components					
sowing dates	Hill spacing	NPK %	Plant height at harvest in cm		No. of fruiting branches/plant		First fruiting node				No. of open bolls/pl		Boll weight (g)		Seed cotton yield (ken./fed.)	
			2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
1st March	15 cm	100 %	139.25	135.75	14.62	13.25	5.75	5.50	46.44	48.66	11.03	14.13	2.14	2.14	6.15	9.37
		125 %	144.25	139.50	15.19	14.50	5.50	5.44	48.23	49.82	11.10	15.09	2.23	2.27	6.55	10.26
		75 %	128.50	135.00	14.44	12.75	5.25	5.63	44.45	47.00	10.48	14.20	2.11	2.13	5.57	8.82
	20 cm	100 %	126.75	128.75	15.19	15.75	5.00	5.06	50.94	51.75	14.07	16.91	2.30	2.57	7.29	10.00
		125 %	127.75	132.25	15.78	16.25	5.50	5.00	54.39	52.01	15.94	18.50	2.38	2.30	9.10	11.27
		75 %	125.00	125.75	15.26	13.50	5.25	5.13	47.70	50.55	13.45	17.23	2.23	2.20	6.59	10.94
	25 cm	100 %	122.75	120.00	15.67	17.75	5.00	4.75	56.31	57.10	16.63	18.96	2.49	2.60	8.27	11.03
		125 %	122.50	123.50	16.02	18.50	5.25	4.56	56.43	59.34	17.38	21.79	2.62	2.75	9.45	12.08
		75 %	118.75	118.25	15.63	17.50	4.75	5.13	54.16	55.90	15.18	17.94	2.41	2.54	6.96	11.45
1st April	15 cm	100 %	164.00	143.00	12.25	10.25	7.25	7.50	27.42	27.45	8.25	11.78	2.07	1.97	5.21	7.26
		125 %	164.75	145.00	12.81	10.50	7.00	7.19	29.91	33.31	8.40	12.18	2.14	2.00	5.54	7.91
		75 %	153.25	139.50	11.94	9.75	6.25	7.75	27.01	26.53	7.58	10.84	2.05	2.07	4.48	6.63
	20 cm	100 %	148.75	135.25	13.25	10.00	6.00	6.81	32.03	29.00	11.15	13.36	2.23	2.11	6.35	8.15
		125 %	154.50	137.25	13.81	10.75	6.75	6.56	33.81	35.97	11.60	12.82	2.32	2.35	7.00	8.41
		75 %	144.50	133.25	13.19	9.25	5.75	6.75	30.82	31.71	10.84	10.74	2.18	2.22	6.06	7.86
	25 cm	100 %	133.50	124.75	14.56	11.88	5.25	6.25	36.20	38.04	13.11	15.70	2.37	2.47	6.86	8.89
		125 %	136.75	125.75	15.25	12.25	5.50	6.00	39.03	40.34	14.12	16.10	2.42	2.57	7.69	9.37
		75 %	122.25	123.50	13.88	11.38	5.25	6.69	35.23	36.25	12.40	14.10	2.33	2.40	6.30	8.14
1st May	15 cm	100 %	169.75	173.00	9.75	9.13	8.50	8.75	12.21	10.95	6.47	8.65	1.81	1.70	3.00	5.33
		125 %	173.25	175.75	10.00	9.64	9.00	8.63	12.85	12.35	7.15	9.51	2.34	1.73	3.90	5.74
		75 %	165.25	170.50	9.69	8.25	9.25	9.06	10.91	10.51	6.34	8.09	1.76	1.74	2.84	5.06
	20 cm	100 %	155.25	167.00	10.13	10.00	8.50	7.75	11.92	11.36	7.82	10.60	2.03	1.87	3.41	5.93
		125 %	158.25	168.75	10.25	10.25	8.50	7.44	14.06	13.40	10.88	11.31	2.09	2.00	4.30	6.36
		75 %	154.25	165.50	10.00	9.75	8.25	8.31	11.19	11.50	7.75	9.88	1.88	1.92	3.12	5.40
	25 cm	100 %	144.00	148.50	10.69	10.63	7.25	7.00	14.11	15.24	10.90	12.64	2.06	2.17	4.74	6.74
		125 %	148.25	153.00	11.00	10.50	7.75	6.94	15.36	16.47	11.90	13.18	2.17	2.19	5.77	7.17
		75 %	139.00	144.25	10.31	9.50	7.25	7.56	12.97	14.72	8.40	11.74	2.03	2.03	3.39	6.43
LSD at 0.05			1.92	**1.45**	**0.82**	**0.82**	**N.S**	**N.S**	**1.30**	**0.85**	**0.80**	**0.15**	**0.13**	**0.05**	**0.21**	**0.17**

The interaction between sowing dates, hill spacing and NPK fertilizer (Table 8) were significant on plant height, number of fruiting branches/plant, carbohydrates, number of open bolls per plant, boll weight and seed cotton yield/fed. in the two seasons Early planting on 1st march, hill spacing of 25cm between hills and 125% NPK fertilizers gave the highest values for carbohydrates , boll weight, number of bolls plants and seed cotton yield/fed. compared with the other interactions in the two seasons.