Journal of AgriSearch 3(1): 17-20

ISSN : 2348-8808 (Print), 2348-8867 (Online)
http://dx.doi.org/10.21921/jas.v3i1.11402

Determination of Critical Period of Weed Control in *Kala Zeera* (*Buniumpersicum bios*) in *Gurez* Valley of Kashmir

PARMEET SINGH*, LAL SINGH, PURSHOTAM SINGH, M A RATHER, SATINDER KOUR, R H KANTH and GURDEEP SINGH

Sher-e- Kashmir University of Agricultural Sciences and Technology of Kashmir, J&K, India

ARTICLE INFO	
Received on :	21.02.2016
Accepted on :	01.03.2016
Published online :	10.03.2016

ABSTRACT

Critical Period of Weed Control (CPWC) is the period in crop growth cycle during which weeds must be controlled to prevent unacceptable yield losses.Two sets of treatments were imposed to represent both increasing duration of weed interference and the length of the weed-free period measured after germination. The first set of treatments consists of increasing duration of weed interference by delaying weed control from the time of crop emergence up to predetermined week (weedy up to 2,4,6,8,10 and 12 weeks after germination (WAG) of *Kala Zeera*) . The second set of treatments established six levels of increasing length of the weed-free period (weed free upto 2, 4, 6, 10 and 12 WAG). Besides two controls (Weed free and weedy check). These comprised of 14 treatments which were laid out in randomized complete block design with three replication. It was revealed that variation in*Kala zeera* seed yield due to weeds is upto 88% and yield gets reduced as low as 48 % in weedy check plots. Early weed competition does not have have profound influence in *Kala zeera* crop.According to average data of two years investigation, it was concluded that Weeds emerging between 6-12 WAG appear to be most detrimental to *Kala zeera* growth and yield and hence qualifies critical stage for weed competition.

Keywords:*Kala Zeera*, Crop-weed competition, CPWC, Response Analysis

INTRODUCTION

Kashmir Himalayan region is by far one of the most enriched natural ecosystems where a large number of highly valued medicinal and aromatic plants grow. *Kala Zeera* (*Buniumpersicum* L) is an important culinary spice cum medicinal plant and has immense potential in *Gurez* valley of temperate Kashmir. It is highly priced (Rs3000-3500), low volume nonperishablecommodity. Agronomic information of *Kala Zeera* is meager (Panwar, 1992). Due to slow initial growth, crop came across a very stiff weed competition. Weeds compete with crop for environmental resources available in limited supply- nutrients, water, CO_2 and light. As a consequence, weeds may significantly reduce yield and impair crop quality resulting in financial loss to the grower/ farmer. Before going for weed management it is pertinent to have knowledge of effects of weed competition on crop yield and it is required to have development of tool that can aid farmers' decision about weed control (Kropff and Spitter, 1992). The critical period of weed control is useful in defining the crop growth stage most vulnerable to weed competition. Knowledge of critical period for weed control assists growers in determining when or when not, to persue further weed control measures to protect crop yield. It is a widely used approach to control crop weed competitions (Hall *et al.*, 1992). Till now very rare literature is available on this rare medicinal cum aromatic spice crop particularly related to weeds. In this study an attempt has been made to determine critical period for weed competition in *Kala Zeera* growing under *Gurez* valley conditions of Kashmir region.

MATERIALS AND METHODS

The field experiment was conducted at Mountain Agriculture Research and Extension Station (MAR & ES) previously Zeera Research Sub Station *Gurez*(78°, 20' N Longitude and 31° 20' E Latitude and at 2393 m amsl) *of Sher-e- Kashmir University of Agricultural Sciences and Technology of Kashmir*, Jammu & Kashmir during *Rabi* seasons of 2009-10 and 2010-11 on a flat narrow valley land. The soil was sandy loam, highly acidic (pH 5.45) and high in organic carbon (1.2%). Available N, P and K in soil were 251, 27 and 235 kg/ha, respectively. Planting material consisting of root tubers already planted in fields one year before (Being perennial crop) planted in 6 m^2 raised plots area at a spacing of 25cm X 25cm. Experiments were conducted on the same site within the research station in successive years. Naturally occurring weed populations were used in trials. Two sets of treatments were imposed to represent both increasing duration of weed interference and the length of the weed-free period measured after germination. The first set of treatments consists of increasing duration of weed interference by delaying weed control from the time of crop emergence up to predetermined week (weedy up to 2,4,6,8,10 and 12 weeks after germination of *Kala Zeera*) . The second set of treatments established six levels of increasing length of the weed-free period (weed free upto 2, 4, 6, 8, 10 and 12 WAG). Besides two controls (Weed free and weedy check).

* Corresponding author Email:parmeetagron@gmail.com

These comprised of 14 treatments which were laid out in randomized complete block design with three replication. The progression of crop development was monitored for all weedy and weed-free controls by recording the average growth stage of 05 consecutive *Kala Zeera* plants. Weeds were removed by hand pulling and hoeing and weed data is recorded from three $1m^2$ quadrats staggered in each experimental unit. All the crop data and weed data was analysed by recommended procedures. The crop was grown under rainfed conditions and was harvested on 25th july and 29th July of 2010 and 2011, respectively. After harvesting *Kala Zeera* crop was sundried until its moisture content was reduced to 14%.The collected data were analyzed statistically by using analysis of variance (ANOVA) technique. Responseanalysis was performed to determine the relationship between weed dry weight accumulation and *Kala zeera*seed yield. The methodology for calculating CPWC was adopted as suggested by Weaver and Tan, 1987.

RESULTS AND DISCUSSION

Weather Conditions

The climate of Gurez valley is temperate. The study area remains snow covered for about five months (December to March) and has an annual rainfall of 550 to 620 mm (April to November). Average temperature ranges from -5 in January to 28.5°C in summer months. The relative humidity varies from 55 to 80%. The ambient temperature varies between minimum of -25°C during last week of December to first week of January to a maximum of 32°C in the month of May during active growth period. The mean daily temperature varied from 14-30°C and mean daily radiations from 10-25 MJ/m2. These ranges of variation define the limits of applicability of the study.

Crop growth and Yield

Except test weight, Harvest Index and essential oil content, all the growth, yield attributes and yields were significantly influenced by different weed management practices (Table 1). The maximum growth yield and yield attributes were observed in weed free plots and were significantly superior over followed plots which were kept weed free up to 10 and 12 weeks after germination (WAG) of *Kala Zeera*i.e. T_{13}& T_{14}. However these two treatmentswere at par in registration of growth and yield attributes. Keeping plots weed free up toto first 2 WAG does not have any significant impact. Probable reason behind it is that initial growing period in this region is extremely slow. So influence on crop is negligible. 4 WAG there is increasing trend in registration of yield and yield attributes with enhancement in weed free period and was in the order of T_1.>T_{14}>T_{13}>T_2>T_{11}>T_{10}. However decreasing pattern was recorded with enhancement of weedy period and was in the order of T_4<T_5<T_6<T_7<T_8<T_2. The highest yield (Both Seed and Straw) was recorded in weed free plots and least in weedy plots.Due to weed infestation the yield losses in *Kala zeera* goes as high as 48%.

Weed infestation

As expected highest weed intensity and weed dry weight was recorded in weedy check control plots (Table 2). The weed data showed an increasing trend with the enhancement of weedy period and decreasing trend with the increase in weed free period. Nadeem*et al.,* 2013 also reported different yields in varying weed competition periods. The treatment T_4 where weeds are kept weed free up to 2WAG does not have significant difference from weedy check plots. The probable reason is that either removed weeds again get sprouted or still due to cool initial growing period the major flush of weeds has not yet germinated during this initial period of crop. Weed control efficiency wasmaximum in T_{14} (Weeds weren't upto 12 WAG) followed by T_{13} (Weeds weren't upto 10 WAG). In respect of weed index there is acceptable reduction in *Kala Zeera* seed yield From $T_{12}$to T_{14}i.e 5.4-15.4 %. Data further revealed that weed emerging with or before germination of the crop are by far most competitive and result in the greatest yield losses as compared to weed emerging at later stages. These results are corroboratory with the findings of Cardina*et al.,* 1995 and Dielema*net al.,* 1996. As expected highest weed intensity and weed dry weight was recorded in weedy check plots

Response Graph Information

The relative yield of *Kala Zeera* with respect to weed free and weedy period also illustrated sharp decrease in yield with the enhancement of weedy period particularly from 6-12 WAG (Fig 1). A possible reason for stiff weed competition from 6-12 WAG might be due to favourable conditions for

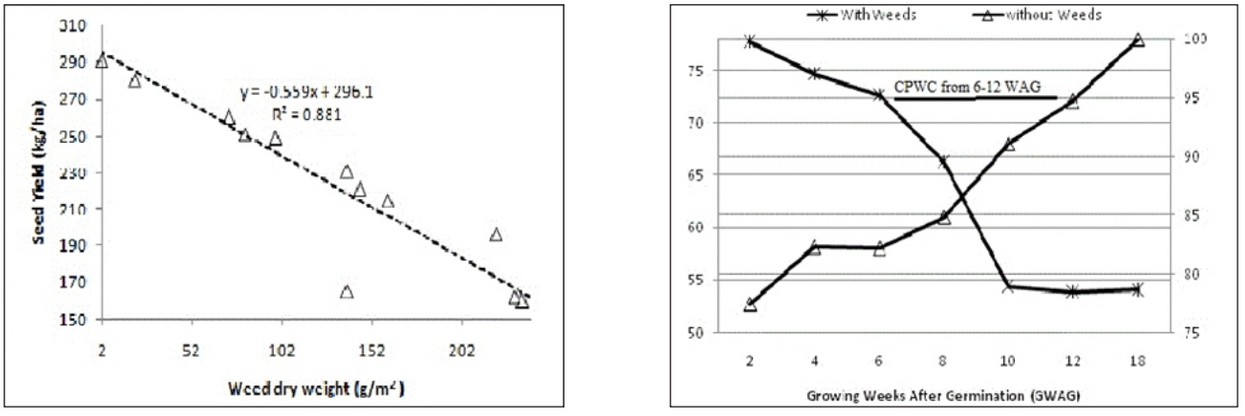

Fig.1: Relative yield of *Kala Zeera* with respect to weed free and weedy period

weeds to flourish. Response analysis further revealed that *Kala Zeera* seed yield is significantly correlated with weed dry weight registration (r= -0.89). Their regression further revealed that 88% of total variation in seed yield can be accounted by linear function involving weed dry matter accumulation. The model for predicting seed yield on the basis of weed dry matter accumulation is Y= 296.1+ 0.599x. So proper management of weeds is pre-requisite to get desired results. Lindquist *et al.*, 1999 also pointed out that the relative time of weed and crop emergence and densities of both crop and weed may explain the variation in the crop weed interference relations Swanton, 2015, also reported corroboratory findings that crops with long critical period, early and effective management is must for approximately 6-10 weeks to prevent weeds from negatively impacting crop yield.

CONCLUSION

According to average data of two years investigation,it was concluded that Weeds emerging between 6-12 WAG appear to be most detrimental to *Kala Zeera* growth and yield. The weeds growing beyond and earlier than this period have tolerable influence on kalazeera seed yield. So weeds infestation is required to be checked during this period to keep influence below the economic thresholdlevel. The results of such experimentare strictly applicable only under existing agro-ecosystem in which the experiment was carried out.

Table 1: Effect of weedy period on yield and yield attributed in Kala Zeera (Averaged over years)

	Treatments Details	Plant height (cm)	Plant dry weight (g/plant)	Umbels/ Plant (No./Plant)	Umbelets/ Plant (No./Plant)	Test weight (g)	seed yield (kg/ha)	Stover Yield (kg/ha)	Harvest Index	Oil content (%)
T_1	Weed Free	51.3	30.1	11.20	78.4	1.62	307.5	1169.2	26.3	7.46
T_2	Weedy Check	31.0	18.5	8.30	38.5	1.64	160.0	637.5	25.1	7.24
T_3	Weeds were in crop 2 WAG	46.3	22.3	9.30	54.3	1.62	231.0	916.7	25.2	7.25
T_4	Weeds were in crop 4 WAG	43.5	21.3	9.10	45.2	1.63	221.0	880.5	25.1	7.36
T_5	Weeds were in crop 6 WAG	43.5	20.1	9.10	45.0	1.63	215.0	856.6	25.1	7.46
T_6	Weeds were in crop 8 WAG	41.5	19.2	8.80	43.8	1.62	196.0	780.9	25.1	7.36
T_7	Weeds were in crop 10 WAG	35.9	18.6	8.30	41.2	1.62	162.0	640.3	25.3	7.26
T_8	Weeds were in crop 12 WAG	33.4	18.1	8.30	40.0	1.62	160.0	634.9	25.2	7.28
T_9	Weeds weren't in crop 2WAG	32.2	18.6	8.33	39.2	1.62	165.0	645.7	25.1	7.21
T_{10}	Weeds weren't in crop 4 WAG	46.3	24.3	10.00	58.0	1.63	249.0	965.1	25.8	7.22
T_{13}	Weeds weren't in crop 10 WAG	51.1	28.3	10.50	72.0	1.64	285.0	1064.6	26.3	7.24
T_{14}	Weeds weren't in crop 12 WAG	51.3	29.5	10.52	73.5	1.64	291.0	1106.5	26.3	7.24
	LSD (P = 0.05)	0.20	0.98	0.03	1.20	Ns	5.89	32.56	Ns	Ns

Table 2: Weed data as influenced by different weed management practices

Treatments Details		Weed Intensity/m2 at 50% flowering	Weed dry weight/m2 At 50% flowering (g/m^2)	Weed control efficiency at 50% flowering(%)	Weed Index (%)
T_1	Weed Free	0.0(0.71)	0.0(0.71)	--	--
T_2	Weedy Check	102.5 (10.15)	**240.35** (15.52)	--	48.0
T_3	Weeds were in crop 2 WAG	78 (8.86)	138.4 (11.79)	42.1	24.9
T_4	Weeds were in crop 4 WAG	81.4 (9.05)	145.4 (12.08)	40.0	28.1
T_5	Weeds were in crop 6 WAG	85.3 (9.26)	160.5 (12.69)	33.1	30.1
T_6	Weeds were in crop 8 WAG	95.4 (9.79)	220.4 (14.86)	8.3	36.3
T_7	Weeds were in crop 10 WAG	95.6 (9.80)	230.6 (15.20)	4.2	47.3
T_8	Weeds were in crop 12 WAG	95.94 (9.82)	235.4 (15.36)	2.2	48.0
T_9	Weeds weren't in crop 2WAG	98.5 (9.95)	235.6 (15.37)	2.1	45.2
T_{10}	Weeds weren't in crop 4 WAG	41.3 (6.47)	98.3 (9.94)	59.0	19.0
T_{11}	Weeds weren't in crop 6 WAG	40.4 (6.40)	81.3 (9.04)	66.2	18.4
T_{12}	Weeds weren't in crop 8 WAG	30.2 (5.54)	72.2 (8.53)	70.1	15.4
T_{13}	Weeds weren't in crop 10 WAG	10.3 (3.29)	20 (4.53)	92.0	8.9
T_{14}	Weeds weren't in crop 12 WAG	5.8 (2.51)	2 (1.58)	99.0	5.4
	LSD (P = 0.05)	1.20	3.50		

Data is subjected to Sq. root transformation
Values within parenthesis are transformed values

REFERENCES

Cardina J, Regnier, E, Puettmann KJ. 1995. Using plant volumes to quantify interference in corn (*Zea mays*.) neighbourhoods. *Weed Science*. **41**:594-599

Dieleman M, Hamill AS, Fox GC, Swanton CJ. 1996. Decision rules for post emergent control of pigweed (Amaranthus spp.) in soybean (Glycine max). *Weed Science***44**: 126-132

Hall, MR, Swanton, CJ, Anderson GW.1992. Critical period of weed control in grain corn(Zea mays). *Weed Science*. **40**: 441-447

Kropff, MJ and Spitters, C. J. T 1992. An ecophysiological model of interspecific competition applied to the influence of *chenopodium album* L on sugarbeat 1. Model description and parameterization.*Weed Research* .**32**: 437-450

Lindquist, JI and Mortensen, DA and Westra P. 1999. Stability of corn (Zea mays)-foxtail (Setaria spp.) interference relationships. *Weed Sci*. **47**: 195-200

Nadeem MA, Tanveer A, Naqqash T, Jhala AJ, and Mubeen K. 2013.Determining weed competition period for Black Seed.*The Journal of Animal and Plant Sciences*.**23**(1):216-221

Panwar, K. 1992. *Kala Zeera*: A low volume, high price crop for dry temperate hills. *Indian Farmers Digest***25**(11):21-23

Swanton CJ, Nkoa R, and Blackshaw RE. 2015. Experimental methods for crop- weed competition studies. *Weed Research*.**63**: 2-11

Weaver SE, And Tan CS. 1987. Critical period of weed interference in transplanted tomatoes and its relation to water stress and shading. *Canadian Journal of Plant Sciences*.**67**:575–583

Citation:

Singh P, Singh L, Singh P, Rather M A, Kour S, Kanth R H and Singh G. 2016.Determination of critical period of weed control in *Kala Zeera (Buniumpersicum bios*) in Gurezvalley of Kashmir.*Journal of AgriSearch***3** (1)17-20