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Discover natural fibres 2009

EVALUATION OF DIFFERENT WEED CONTROL METHODS IN COTTON FIELD



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তুলা উন্নয়ন বোর্ড
COTTON DEVELOPMENT BOARD

INTRODUCTION

BANGLADESH COTTON: CURRENT SCENARIO

- **2nd** largest apparel producer in the world
- **2nd** largest cotton fibre consumer in the world
- **Highest** Raw cotton importer in the world with **6.25 million bales** annual requirment-**10.30%** of world import
- **Fibre Imports** from-India, Uzbekistan, USA, Egypt, CIS and some African countries
- **31.50 billion** US dollar business in 2016 expected creep up to **50 billion dollar** in 2021

COTTON SECTOR IN BANGLADESH

A. READYMADE GARMENTS	Garments unit	5000
	Total Work Force	5.5 million
B. TEXTILE	Knit wear industries	1700
	Weaving mills	1343
	Hand loom	0.3 million
C. SPINNING	Spinning mill	407
D. GINNING	Ginning Centres	Private-20, CDB-12
	Saw ginning	104
	Roller ginning	25
E. OIL EXTRACTION	Crude oil expeller	15
	Oil refinery	01

Growing Season of Upland Cotton (Kharif-2)

	July	Aug.	Sept.	Oct.	Nov.	Dec.
Land Preparation & Sowing						
Crop Management						
Harvesting						

Growing Season of Upland Cotton (Rabi)

	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.
Land Preparation & Sowing							
Crop Management							
Harvesting							

Major weeds commonly found in the cotton field

Weed species	Common Name	Local Name	Family
Cynodon dactylon	Bermuda grass	Durba	Gramineae
Cyperus rotundus	Nut Sedge	Mutha	Cyperaceae
Eleusine indica	Goose grass	Chapra	Gramineae
Ageratum conyzoides	Goat weed	Chaglagacha	Compositae
Panicum repens	Torpedo grass	Banchina	Gramineae
Digitaria sanguinalis	Scrab grass	Angulighash	Gramineae
Cyanotis axillaris	Kanainala	Kanainala	Commelinaceae
Commelina benghalensis	Spider wort	Kanaibashi	Commelinaceae
Azonopus compressus	Carpet grass	Karpetghash	

Farmers Practice - Manual Weed Control

1. Increase production cost due to high labour price.
2. Unavailability of agricultural labour force.
3. Doesn't perform timely weed control due to unfavourable weather condition.

Farmers Practice - Chemical Weed Control

1. Glyphosate base weed control.
2. High crop injury and seedling mortality.
3. Not feasible during seedling stage of cotton plant.

OBJECTIVES

- To select economical and suitable weed control method for controlling weeds in cotton field.
- To evaluate the weed control efficiency of different weed control methods.

Experiment-1

Efficacy of Different Herbicides Over Manual Weeding in Controlling Cotton Weed

METHODS AND MATERIALS

Design : RCBD

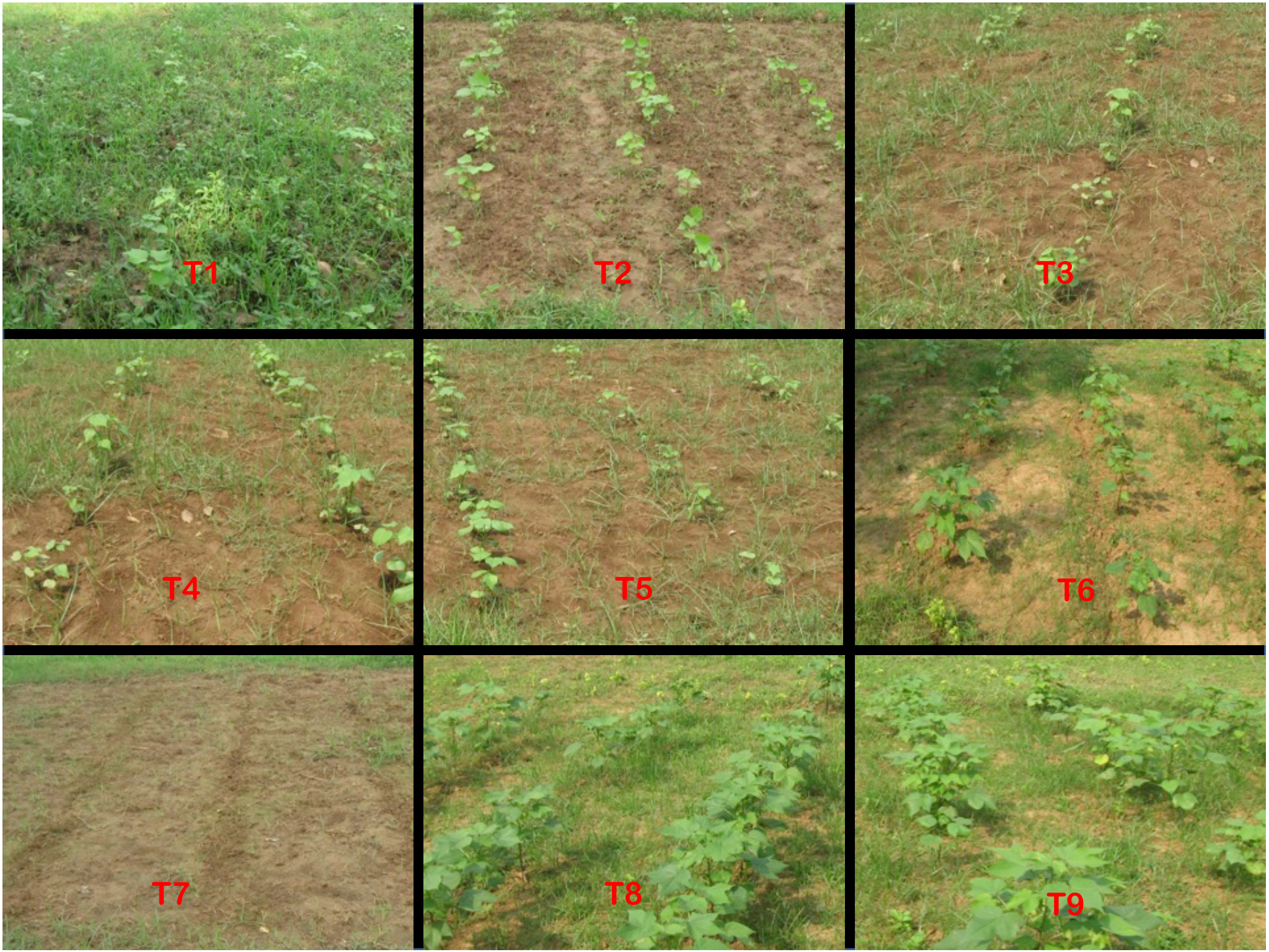
No. of replication: 3

Treatments:

- **T_1= Weedy control**
- **T_2= Hand weeding**
- **T_3= Glyphosate @ 3.5 L ha^{-1} 14 DBS of cotton**
- **T_4= Paraquat @ 2.8 L ha^{-1} 14 DBS of cotton**
- **T_5= Glyphosate @ 3.5 L+ Paraquat @ 2.8 L ha^{-1} 14 DBS of cotton**
- **T_6= Orthosulfamuron @ 0.15 g ha^{-1} 14 DAS of cotton (Protective spray)**
- **T_7= Indazifalam @ 0.15 L ha^{-1} 14 DBS of cotton**
- **T_8= Phenoxyprop-P-Ethyle @ 0.75 L ha^{-1} 14 DAS of cotton (Protective spray)**
- **T_9= Cyhalophob-butayl @ 1.0 L ha^{-1} 14 DAS of cotton (protective spray)**
- **T_{10}= Bispyribac sodium@ 0.15 g ha^{-1} 14 DAS of cotton(protective spray)**

Date of sowing: 01 September, 2013

Cotton variety : CB-9


T1
T2
T3
T4
T5
T6
T7
T8
T9

RESULTS AND DISCUSSION

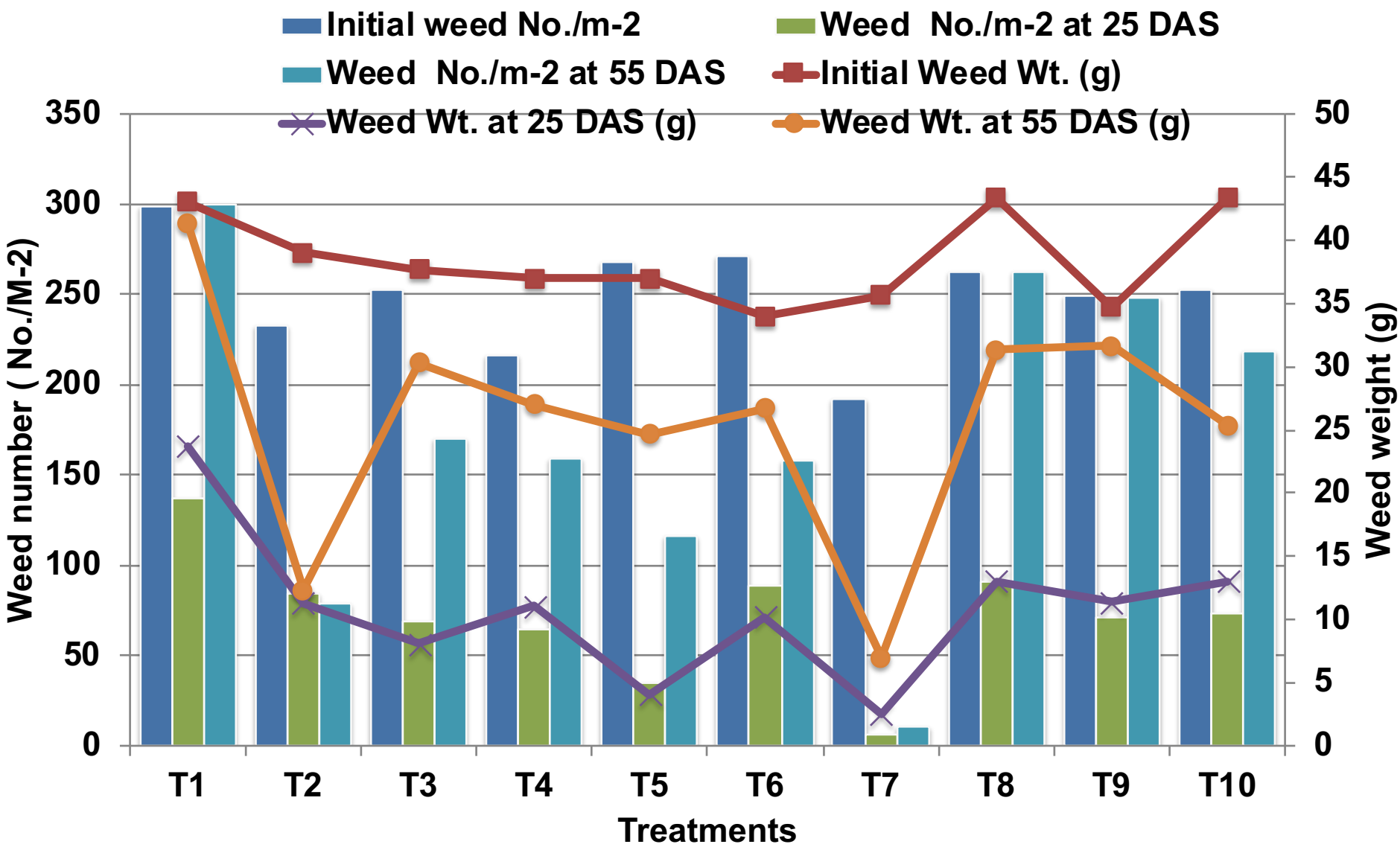


Fig 1.1: Weed abundance as influenced by different herbicide application and manual weed control

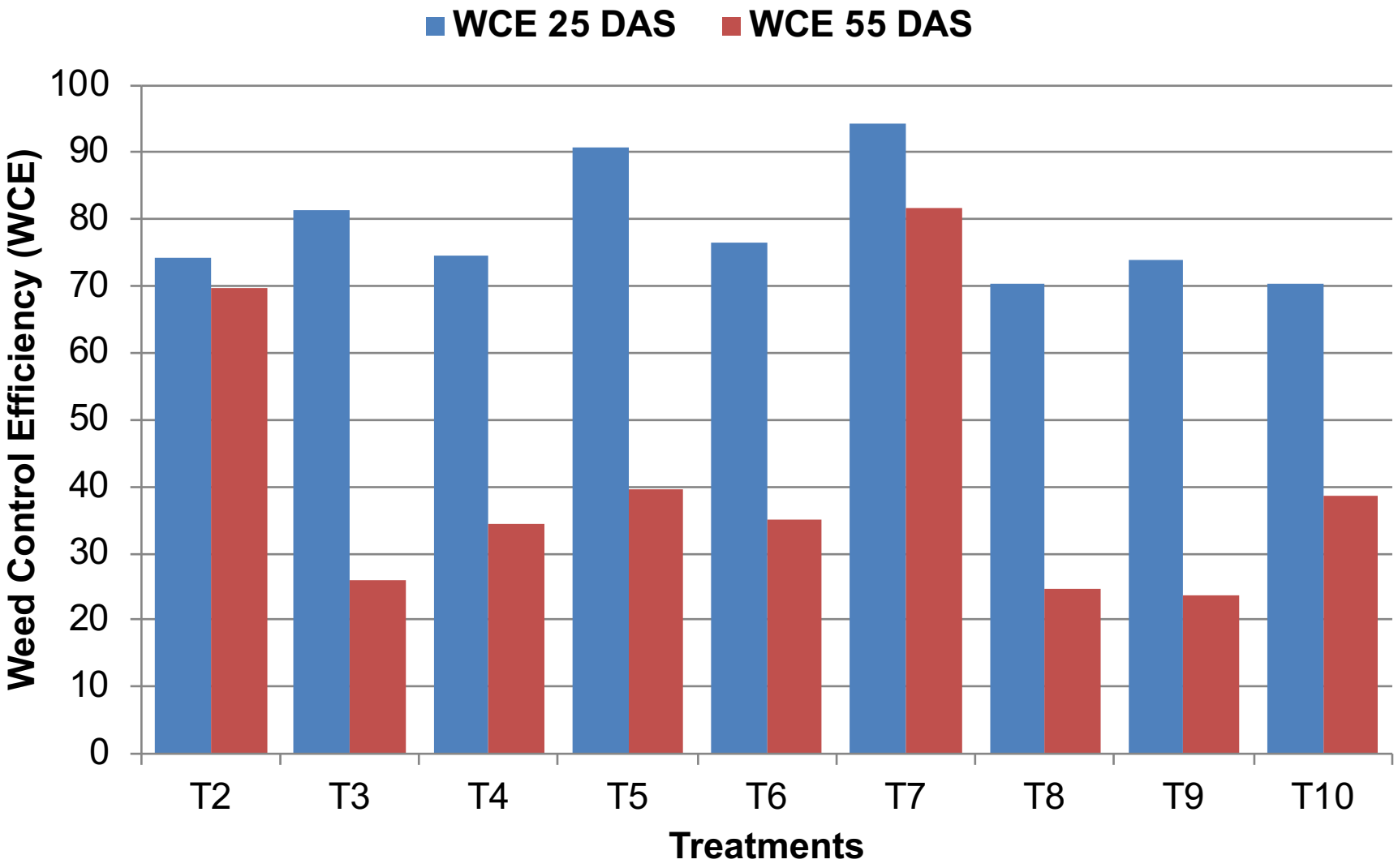


Fig. 1.2: Weed control efficiency of different herbicides and manual weeding

Table 1.1: Plant count and morphological characters of cotton as influenced by different herbicide application and manual weeding

Treatment	No. of plant/ha	Sympodial br/ plant	Monopodial br/ plant
T_1	22500	7.33	1.30
T_2	24550	7.80	1.20
T_3	23180	8.10	1.20
T_4	23320	7.23	0.87
T_5	24280	8.46	0.90
T_6	19070	6.50	1.03
T_7	3429	1.83	0.37
T_8	21260	7.30	1.70
T_9	17830	7.63	1.07
T_{10}	18110	8.90	1.10
$LSD_{0.05}$	3375	1.76	0.395
CV%	9.96	14.45	21.49

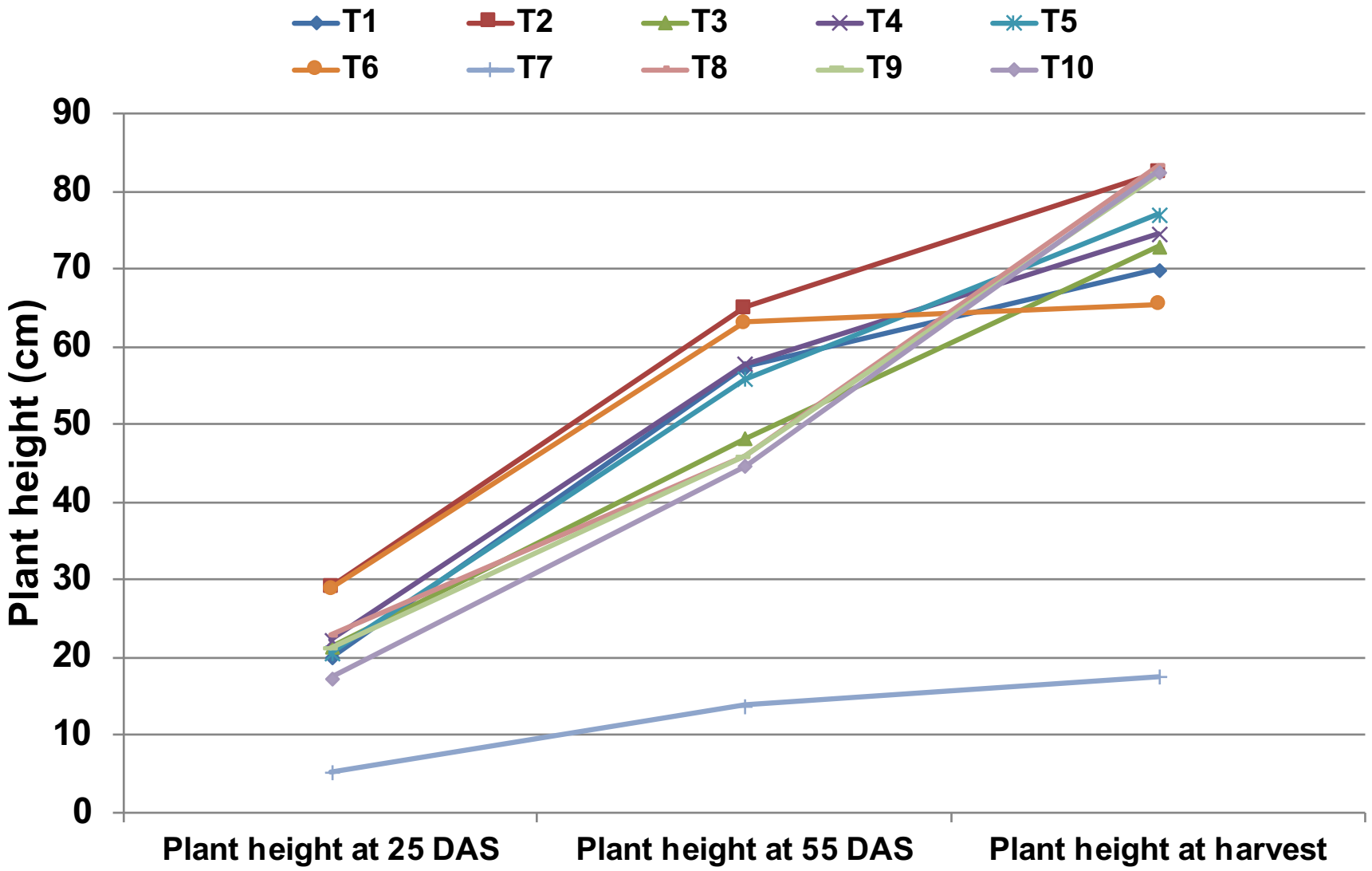


Fig 1.3: Plant height of cotton as influenced by different herbicide application and manual weed control

Table 1.2: Yield and yield components of cotton as influenced by different herbicide application and manual weeding

Treatment	Seed Cotton Yield Kg ha^{-1}	No. of boll $plant^{-1}$	Single boll wt (g)
T_1	384.1	13.60	5.30
T_2	1289.0	17.23	5.96
T_3	1207.0	16.40	5.80
T_4	1008.0	17.00	4.53
T_5	1211.0	19.60	6.27
T_6	912.2	16.30	5.60
T_7	144.0	3.633	1.67
T_8	761.3	16.37	6.13
T_9	925.9	16.50	5.87
T_{10}	939.6	14.30	5.77
$LSD_{0.05}$	173.00	3.85	1.63
CV%	11.48	14.86	17.91

Table 1.3: Economic return as influenced by different herbicide application and manual weeding

Treatment	Variable cost (Tk ha^{-1})	Gross return (Tk ha^{-1})	Net return (Tk ha^{-1})	BCR
T_1	55575	24698	-30877	0.44
T_2	68075	82207	14132	1.21
T_3	56275	76641	20366	1.36
T_4	56135	64104	7969	1.14
T_5	56205	77043	20838	1.37
T_6	55800	57969	2169	1.04
T_7	55875	9172	-46703	0.16
T_8	55950	48537	-7413	0.87
T_9	55875	58982	3107	1.06
T_{10}	55800	59795	3995	1.07

Experiment-2

Evaluation of Chemical, Mechanical and Manual Weed Control in Cotton

METHODS AND MATERIALS

Design : RCBD

No. of replication: 3

Treatments:

- **T_1 = Manual weeding (three hand weeding at 20, 35 and 50 DAS)**
- **T_2 = Mechanical weeding (culturing by power tiller at 20, 35 and 50 DAS)**
- **T_3 = Post-emergent herbicide (Glyphosate @ 4.7 lit ha^{-1}) at 20 DAS**
- **T_4 = Pre-emergent herbicide (Pendimethalin @) 3.75 lit ha^{-1}) at sowing**
- **T_5 = Pre-emergent (Pendimethalin @) 3.75 lit ha^{-1}) at sowing+ Post-emergent (Glyphosate @ 4.7 lit ha^{-1}) at 35 DAS**
- **T_6 = Post-emergent herbicide (Glyphosate @ 4.7 lit ha^{-1}) at 20 DAS+ mechanical weeding at 50 DAS**
- **T_7 = Pre-emergent herbicide (Pendimethalin @) 3.75 lit ha^{-1}) at sowing+ mechanical weeding at 35 DAS**
- **T_8 = Weedy check (untreated)**

Date of sowing: 22 July 2014

Cotton variety : CB-12


T1

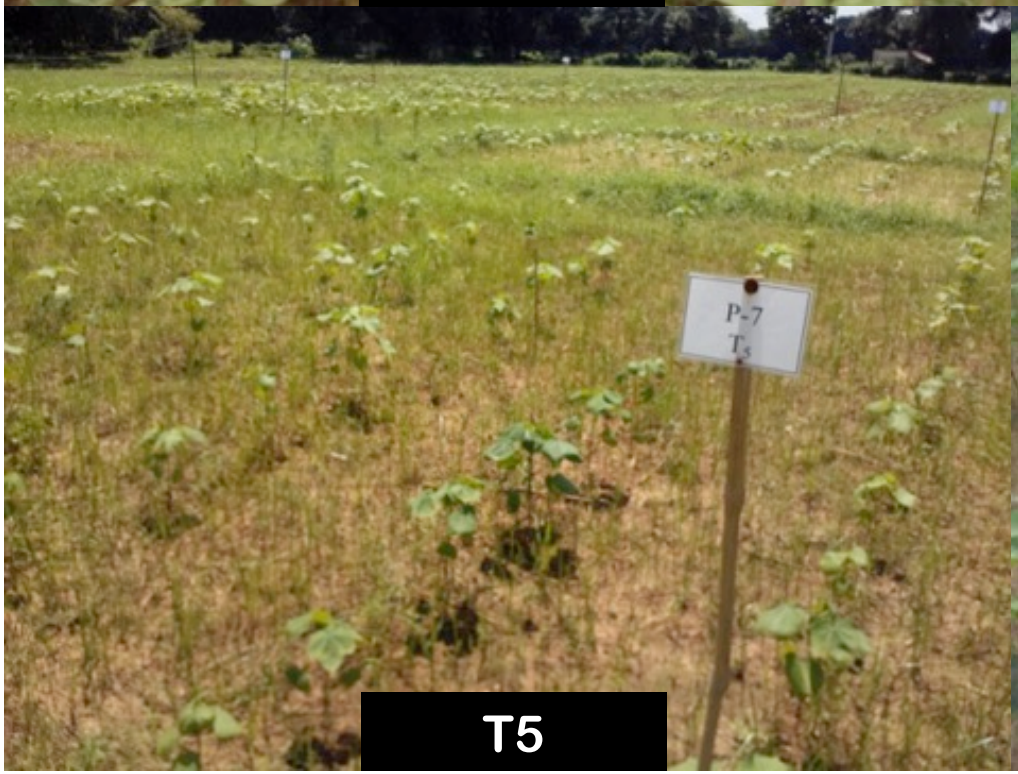

P-24
T1
T1


T2


P-14
T2
T2


P-16
T3
T3


P-9
T4
T4


P-7
T5
T5


T5


T6


P-15
T6
T6


P-13
T7
T7


P-11
T8
T8

RESULTS AND DISCUSSION

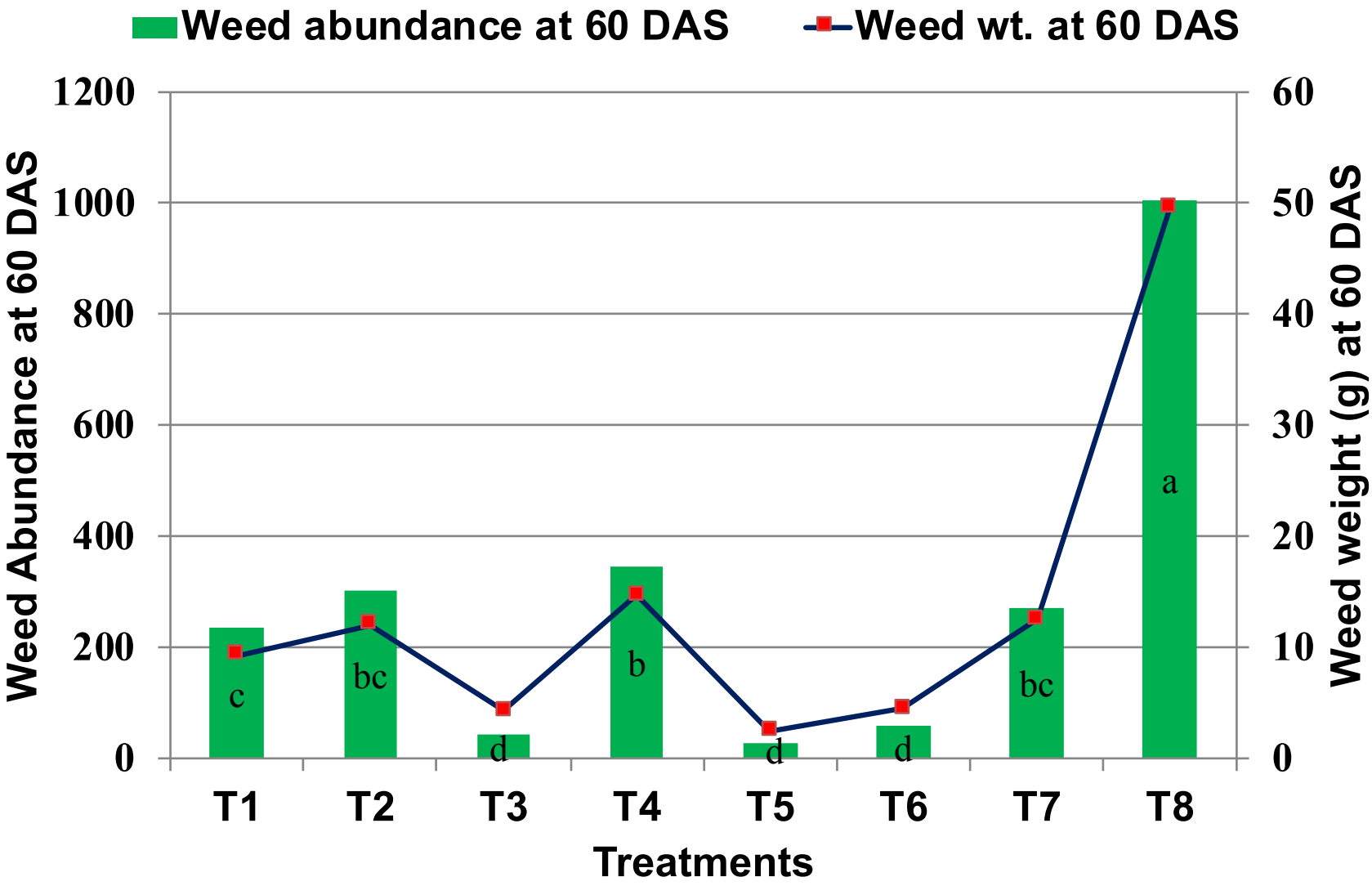


Fig. 2.1: Weed abundance and weed weight as influenced by chemical, mechanical and manual weeding

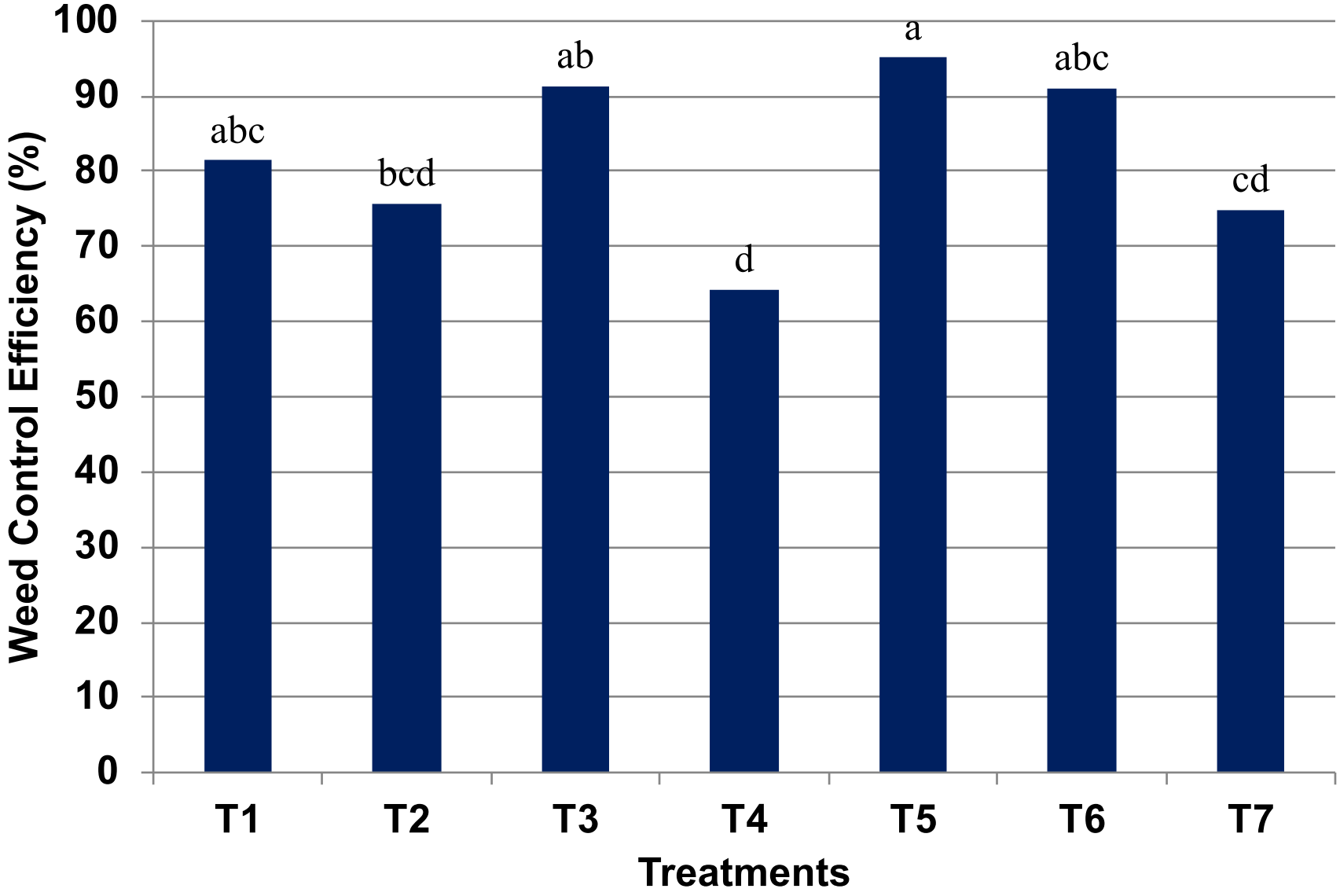


Fig. 2.2: Weed control efficiency of different chemical, mechanical and manual weeding

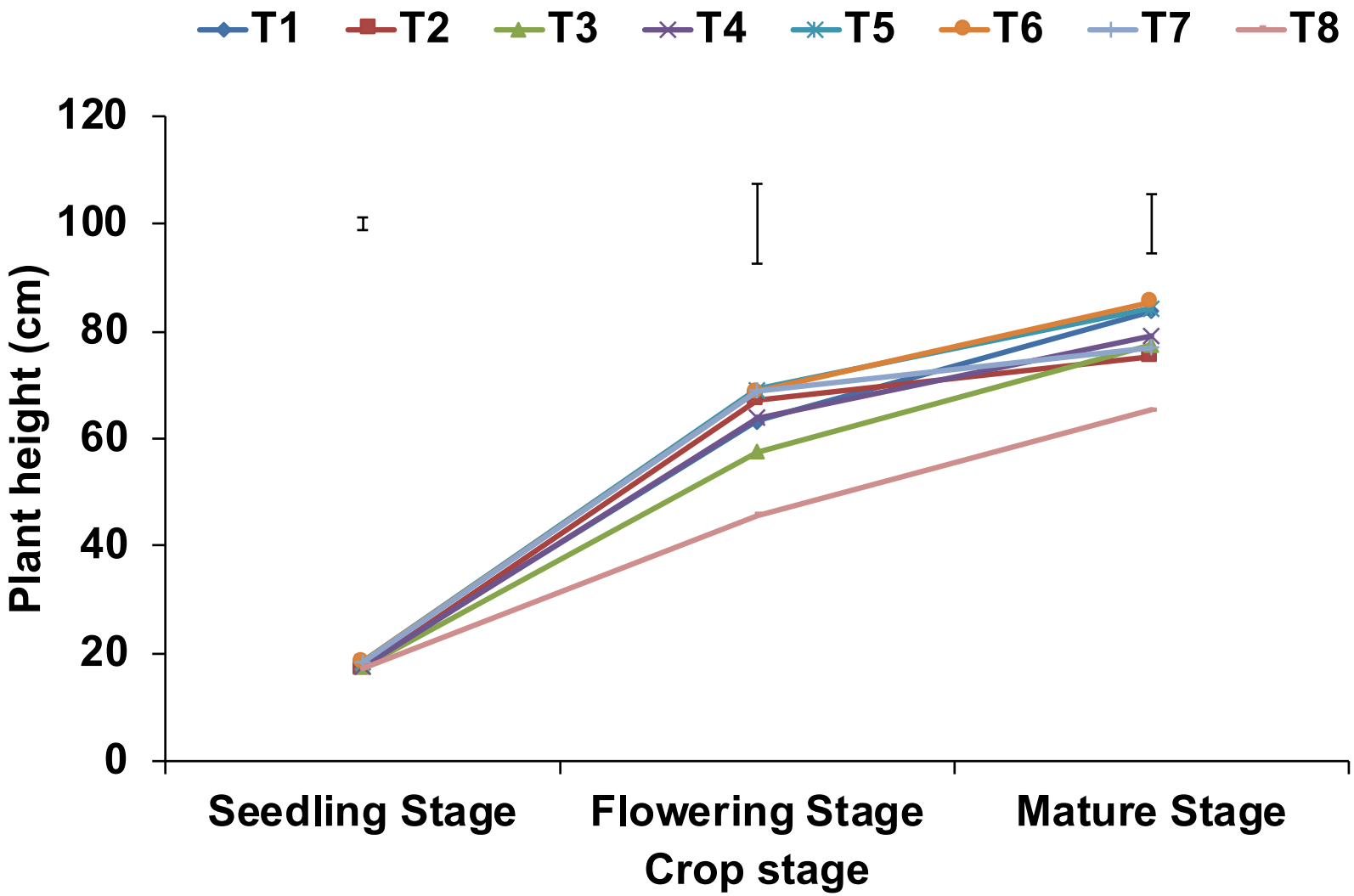


Fig. 2.3: Plant height of cotton as influenced by chemical, mechanical and manual weeding

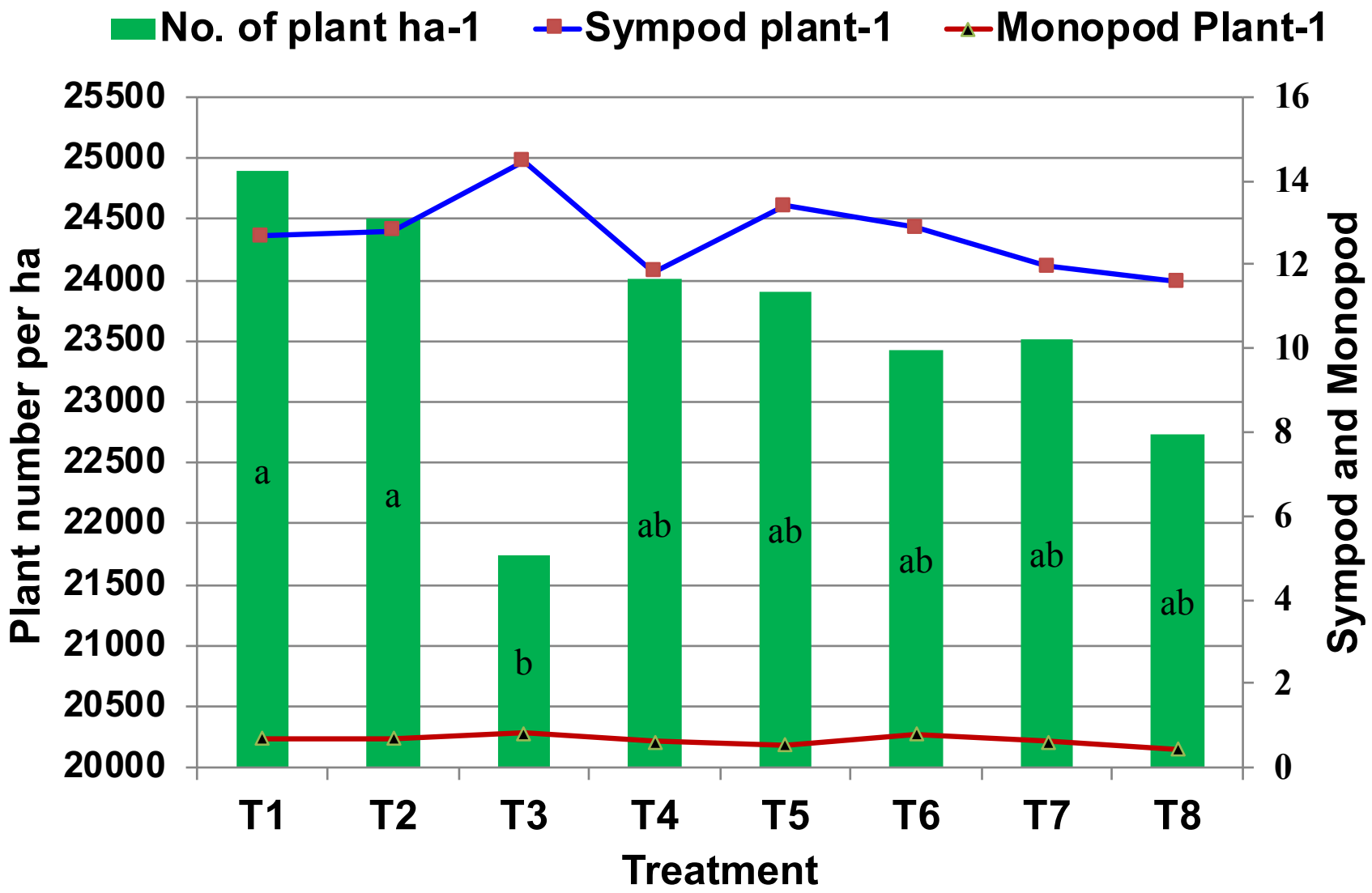


Fig. 2.4: Plant number, Sympodial and Monopodial br. as influenced by chemical, mechanical and manual weeding

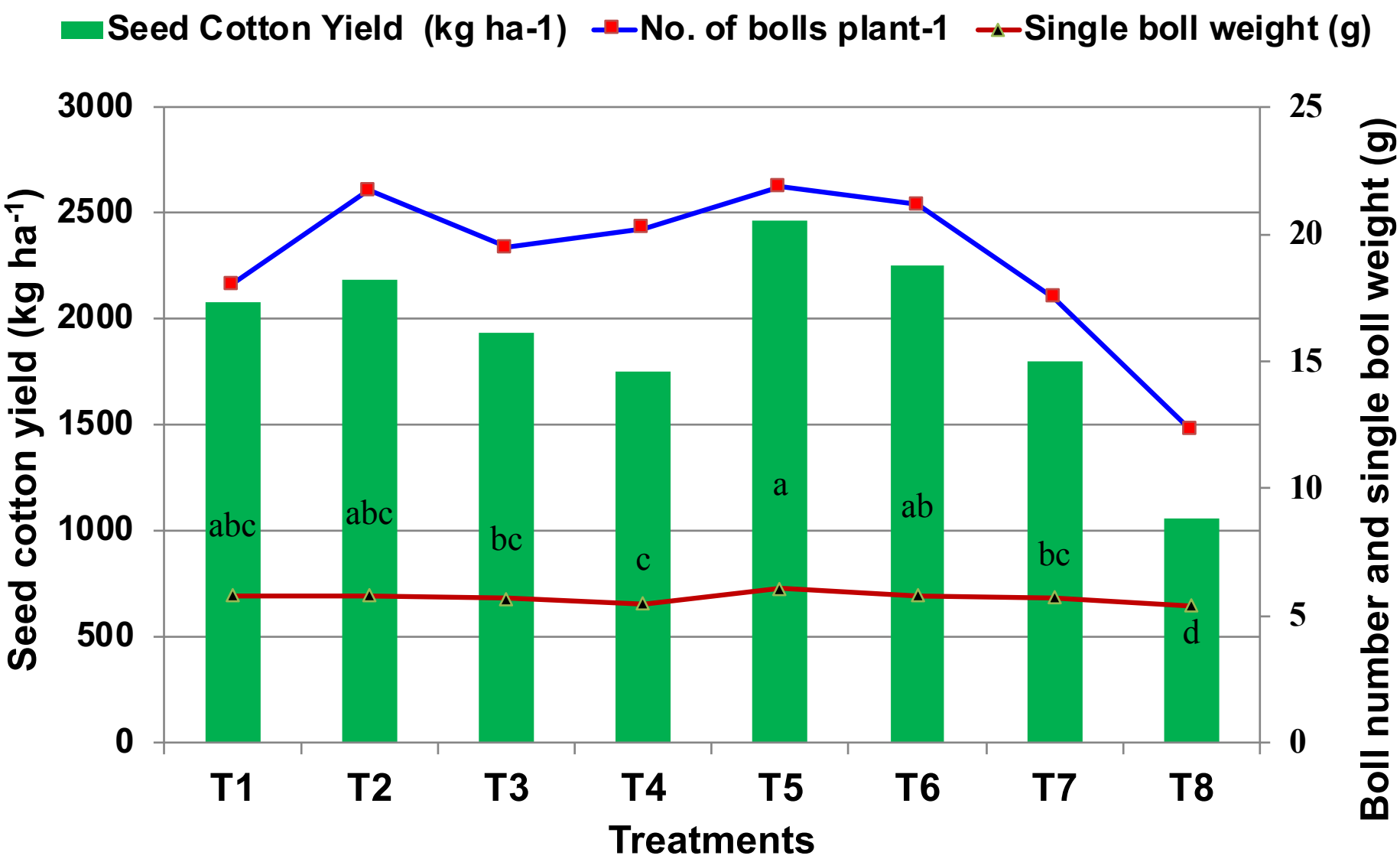


Fig. 2.5: Seed cotton yield, boll number and weight as influenced by chemical, mechanical and manual weeding

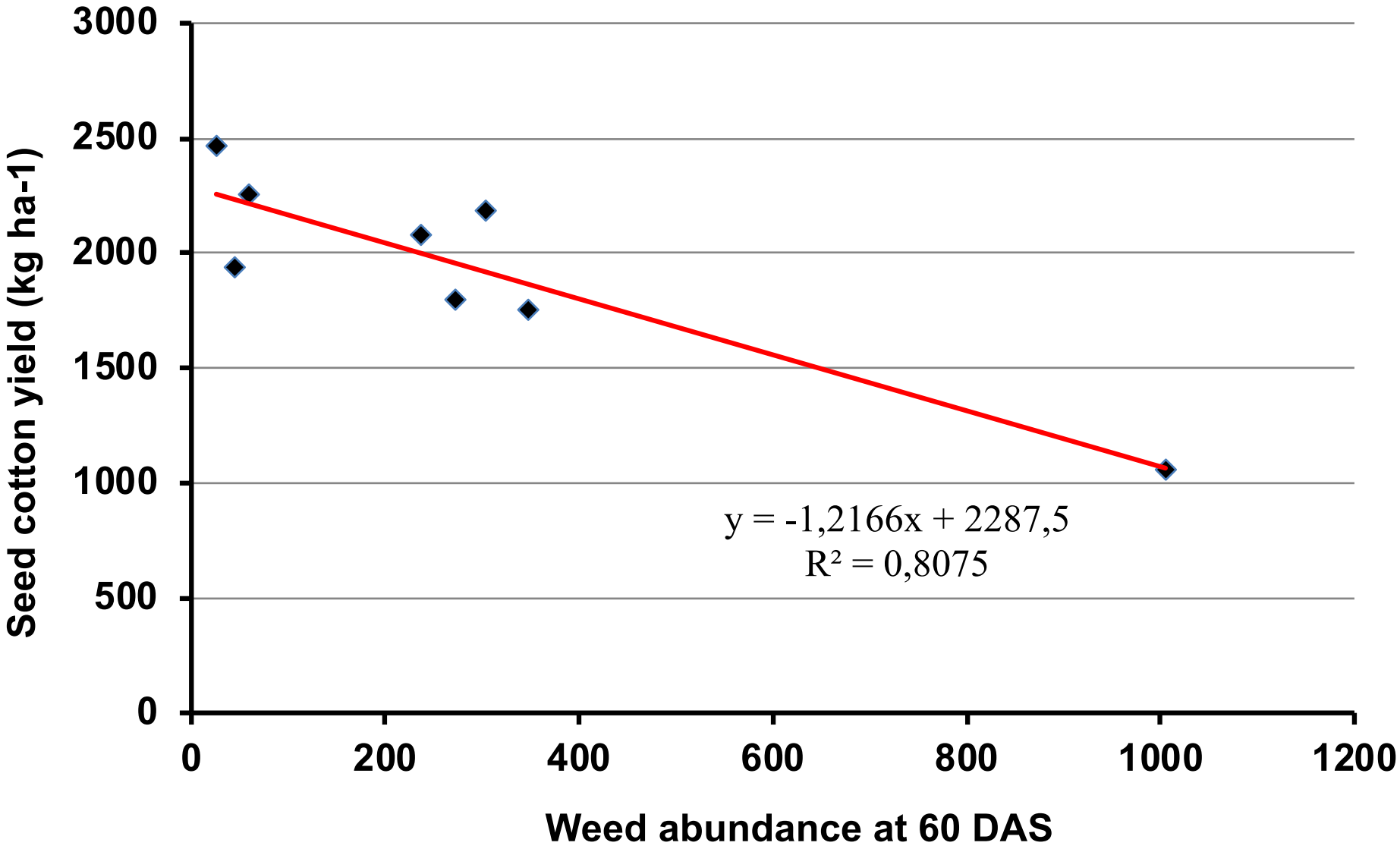


Fig. 2. 6: Functional relationship between Seed cotton yield and weed abundance in different chemical, mechanical and manual weeding

Table 2.1: Gin properties of cotton as influenced by different chemical, mechanical and manual weed control method in cotton

Treatment	Lint % (GOT)	Seed %	Lint Index	Seed Index
T_1	40.50	59.00	6.71	9.77
T_2	40.63	58.87	6.77	9.80
T_3	40.93	58.57	6.69	9.57
T_4	40.20	59.30	6.65	9.80
T_5	40.57	58.93	6.86	9.97
T_6	40.57	58.93	6.77	9.83
T_7	40.93	58.57	6.76	9.67
T_8	40.33	59.17	6.48	9.50
$LSD_{0.05}$	1.48	1.48	0.47	0.34
CV%	2.08	1.43	4.01	1.99

Table 2.2: Economic return as influenced by different chemical, mechanical and manual weed control method in cotton

Treatment	Variable cost (Tk ha^{-1})	Gross return (Tk ha^{-1})	Net return (Tk ha^{-1})	BCR
T_1	94375	101070	6695	1.07
T_2	80815	106355	25540	1.32
T_3	82300	93794	11494	1.14
T_4	82150	85344	3194	1.04
T_5	85675	119554	33879	1.40
T_6	82980	109316	26336	1.32
T_7	82830	87579	4749	1.06
T_8	78775	51549	-27226	0.65

Experiment-3

Efficacy of Different Herbicides Over Manual Weeding in Controlling Cotton Weed

METHODS AND MATERIALS

Design : Split plot

No. of replication: 3

Treatments:

Factor-A: Variety

V_1=CDB variety CB-14

V_2=Hybrid Variety Rupali-1

Factor-B: Weed Control Method

WC_1= Panida (Pendimethalin) @) 3.75 lit ha^{-1} at cotton sowing+ Glyfocel (Glyphosate) @ 4.7 lit ha^{-1} at 35 DAS

WC_2= Panida (Pendimethalin) @ 3.75 lit ha^{-1} 3 days after cotton sowing + Glyfocel (Glyphosate) @ 4.7 lit ha^{-1} at 35 DAS

WC_3= Panida (Pendimethalin) @) 3.75 lit ha^{-1}+ Glyfocel (Glyphosate) @ 4.7 lit ha^{-1} before cotton emergence

WC_4= Panida (Pendimethalin)@)3.75 lit ha^{-1} at cotton sowing+ Paraquat @ 4.7 lit ha^{-1} & Glyfocel (Glyphosate) @ 4.7 lit ha^{-1} at 35 DAS

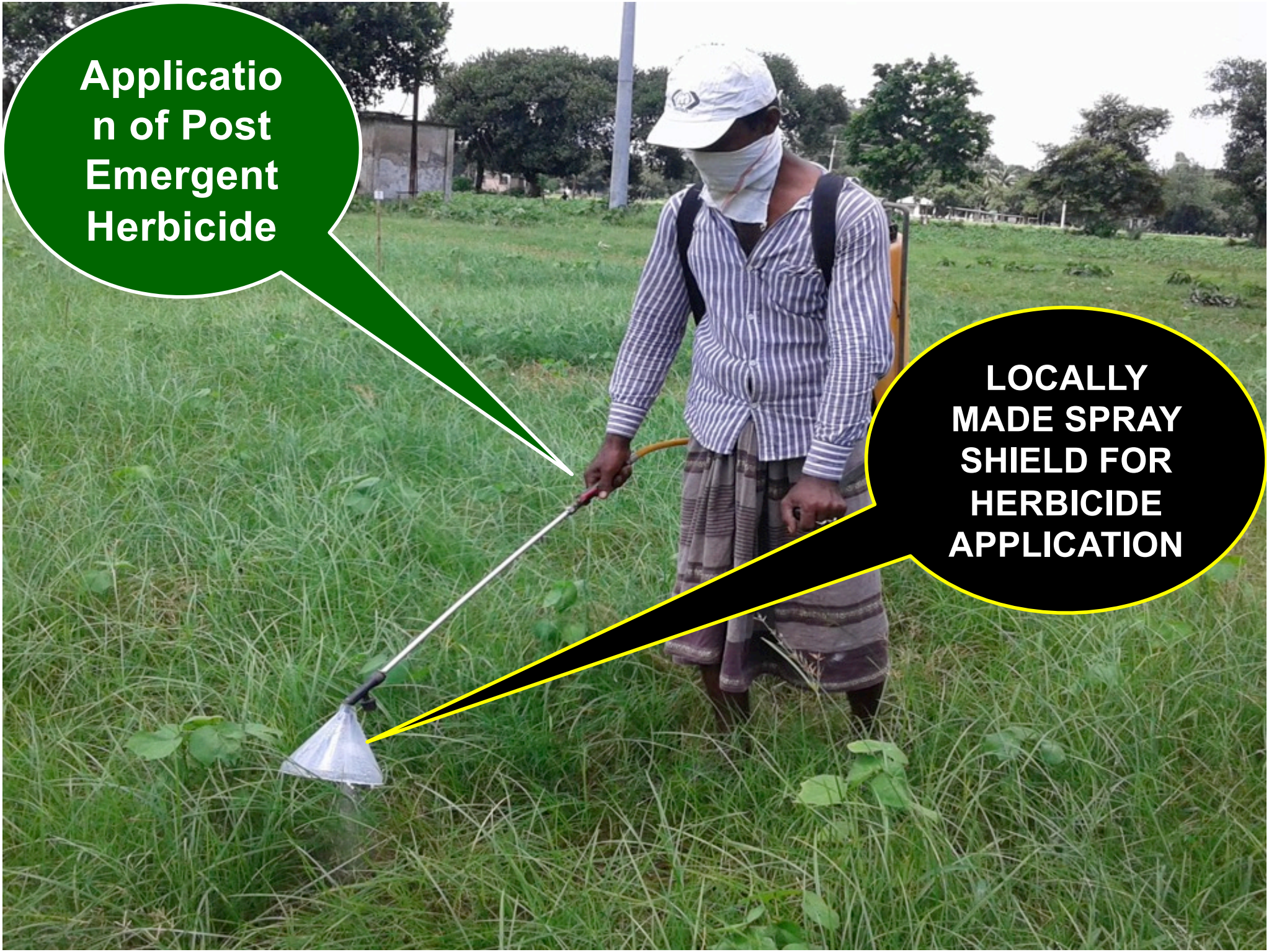
WC_5= Panida (Pendimethalin) @) 3.75 lit ha^{-1} at sowing followed by water hyacinth mulch at 15 DAS

WC_6= Weed free plot

WC_7= Weedy check (untreated)

Date of sowing: 10 August, 2015

RESULTS AND DISCUSSION


Applicatio
n of Post
Emergent
Herbicide
LOCALLY
MADE SPRAY
SHIELD FOR
HERBICIDE
APPLICATION


Application of
Pre- Emergent
Herbicide

Cotton plant and weed abundance after application of pre emergent herbicide


Weedy Checked Plot


Weed Free Plot

Experimental plot: pre emergent herbicide at sowing and post emergent herbicide at 35 DAS

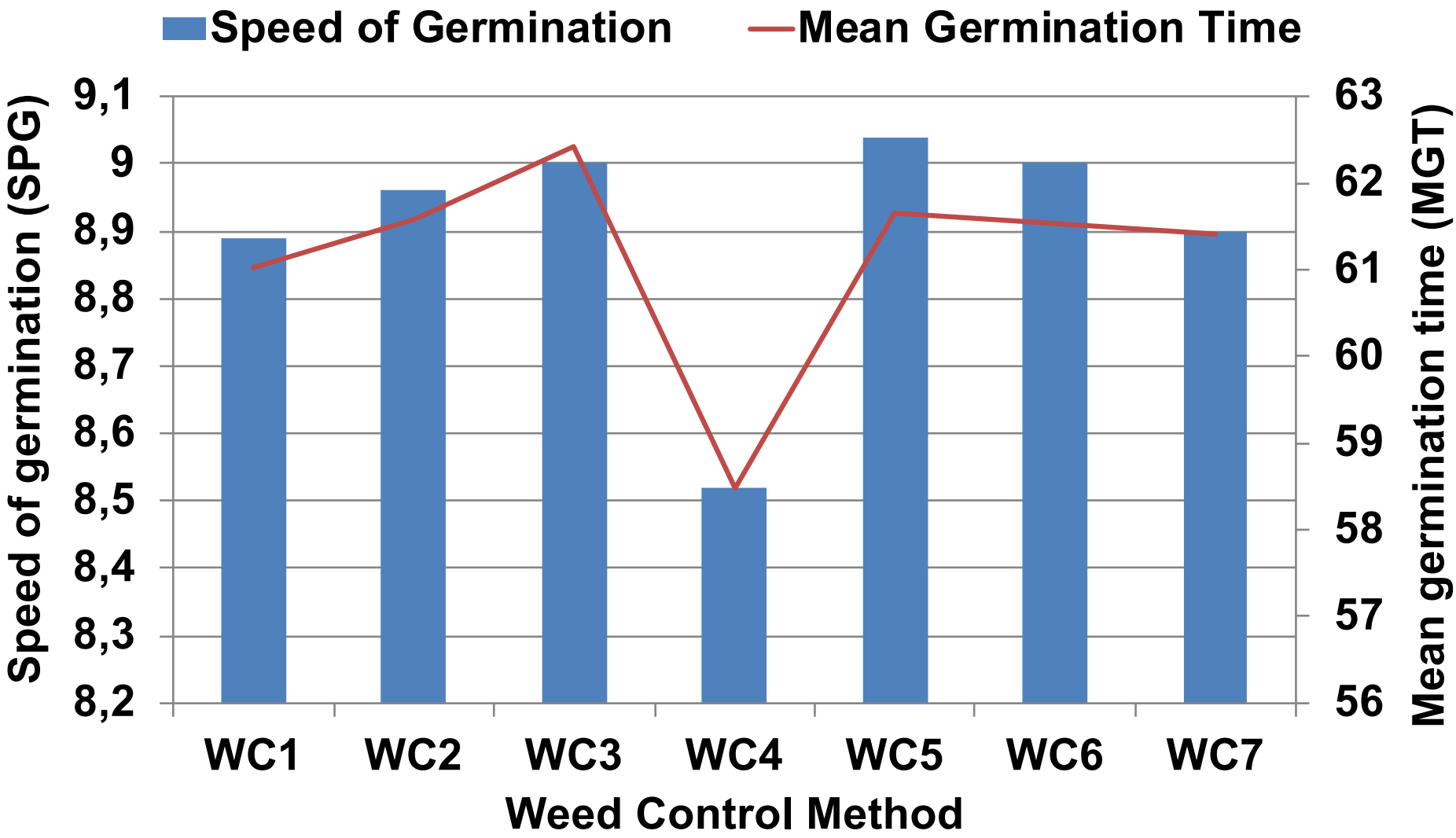


Fig 3.1: Speed of germination (SPG) and Mean germination time (MGT) as influenced by different weed control methods.

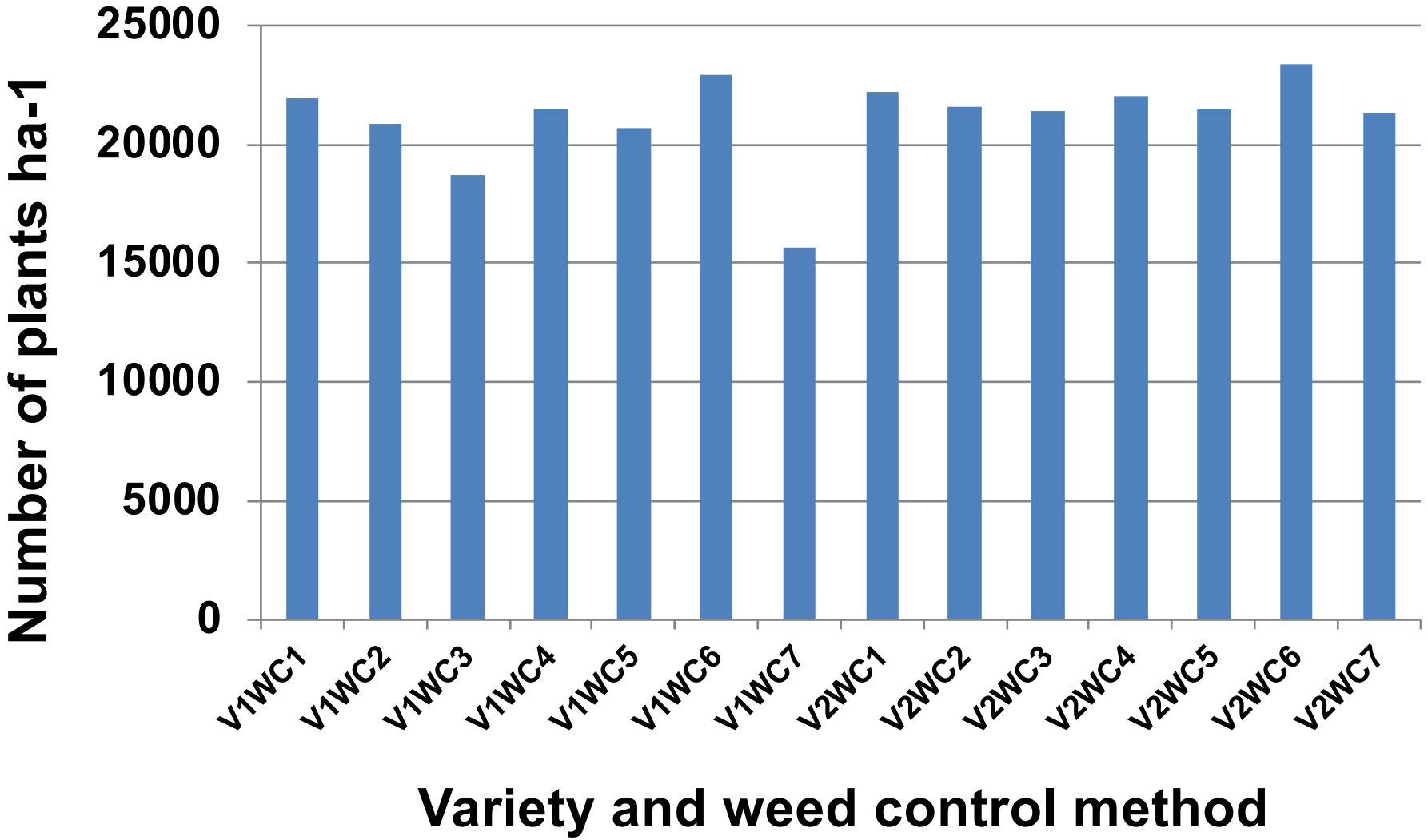


Fig 3.2: Number of plants ha^{-1} as influenced by variety and weed control methods.

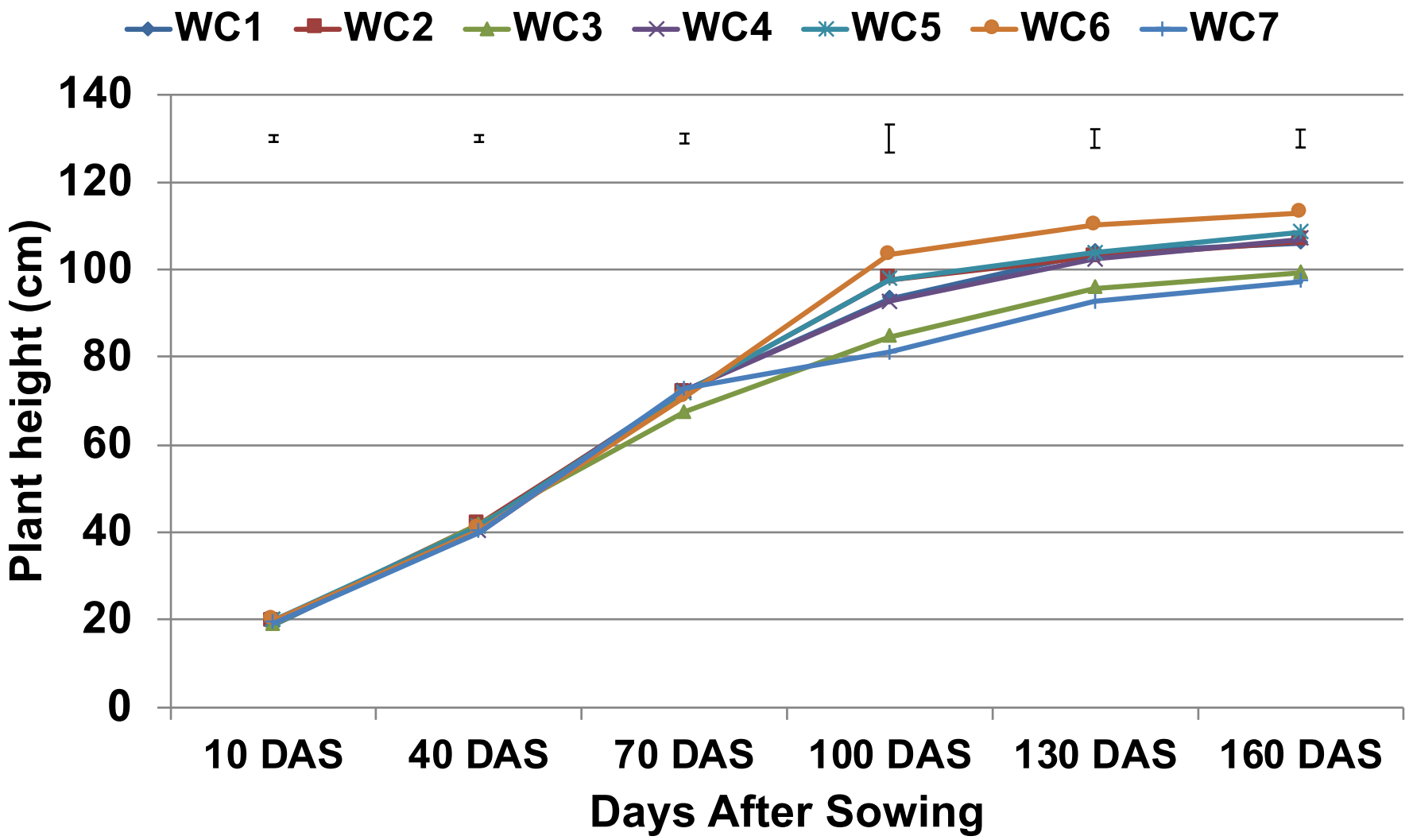


Fig 3.3: Plant height of cotton at different days after sowing as influenced by different weed control methods.

Table 3.1: Yield and yield components of cotton as influenced by different weed control methods.

Weed control methods	No of sympodial br. plant^{-1}	No of monopodial br. plant^{-1}	No. of bolls plant^{-1}	Single boll weight (g)	Seed Cotton Yield (kg ha^{-1})
WC_1	14.40	0.35	27.32	5.64	2175.14
WC_2	12.08	0.30	23.12	4.44	1885.84
WC_3	9.080	0.23	17.98	4.20	1239.34
WC_4	12.08	0.60	27.16	5.12	1713.00
WC_5	11.32	0.62	22.12	4.58	1633.09
WC_6	15.18	0.47	34.14	5.84	3213.74
WC_7	7.800	0.30	13.00	3.58	666.58
$LSD_{0.05}$	1.66	0.16	2.06	0.50	102.05
CV%	26.22	66.01	30.53	18.91	42.71

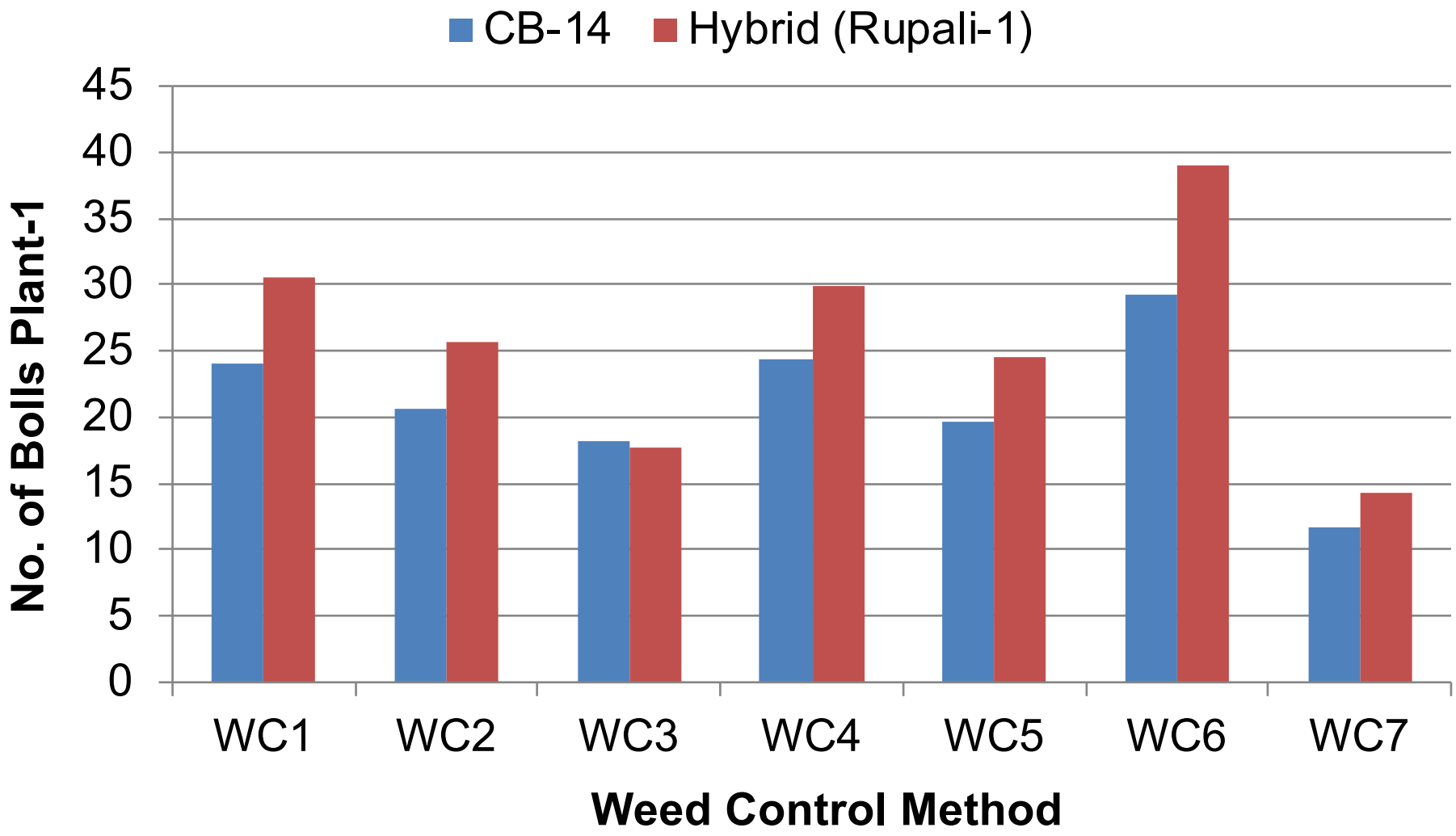


Fig 3.4: Number of bolls plant^{-1} as influenced by variety and weed control methods

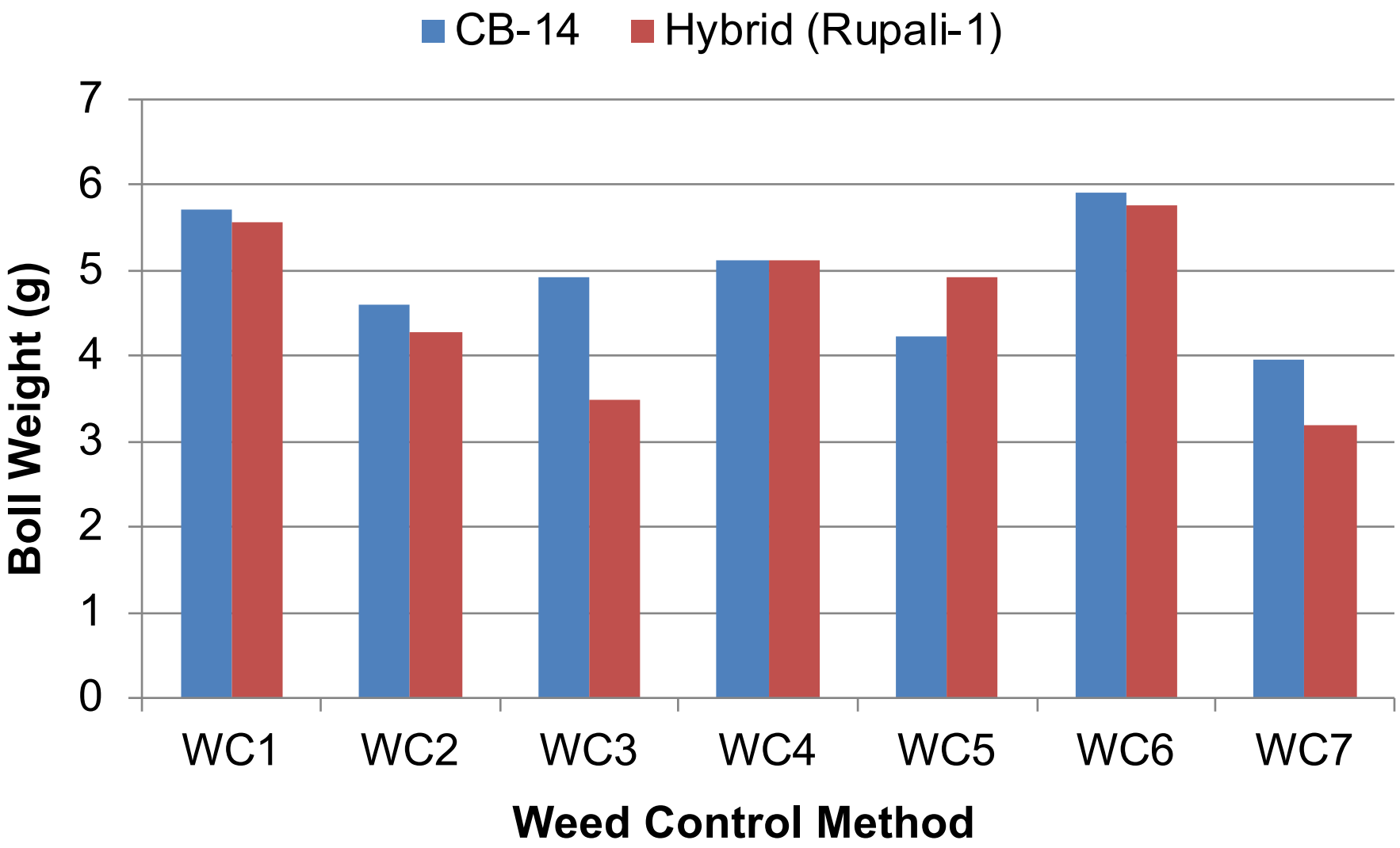


Fig 3.5: Cotton single boll weight (g) as influenced by variety and weed control methods.

Table 3.2: Economic return as influenced by variety and weed control method in cotton

Weed control methods	Variable cost (Tk ha^{-1})	Gross return (Tk ha^{-1})	Net return (Tk ha^{-1})	BCR
V_1WC_1	76880	113695	36815	1.48
V_1WC_2	77660	92711	15051	1.19
V_1WC_3	78180	62497	-15683	0.80
V_1WC_4	77920	88973	11053	1.14
V_1WC_5	78960	87424	8464	1.11
V_1WC_6	81230	150469	69239	1.85
V_1WC_7	70830	38663	-32167	0.55
V_2WC_1	91695	117986	26291	1.29
V_2WC_2	92475	108278	15803	1.17
V_2WC_3	92995	70364	-22631	0.76
V_2WC_4	92735	93545	810	1.01
V_2WC_5	93775	86626	-7149	0.92
V_2WC_6	96045	190615	94569	1.98
V_2WC_7	85645	32798	-52847	0.38

CONCLUSION

- Chemical weed control method in combination with pre-emergent herbicide at sowing and post emergent herbicide at 35 DAS effectively control cotton weed.
- The result of the experiment can be forwarded to on farm trial and demonstration at different locations in the country to control cotton weed.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