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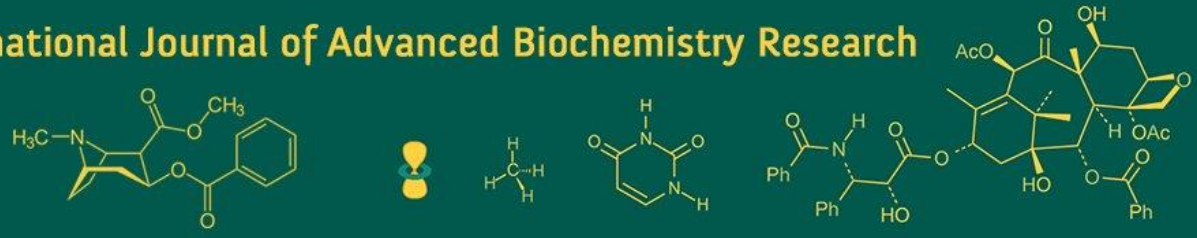

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Effect of different weed management practices on weed dynamics of gladiolus (*Gladiolus grandiflorus* L.) cv. Arka Pratham

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Abstract
A field investigation entitled "Effect of different weed management practices on weed dynamics of gladiolus (*Gladiolus grandiflorus* L.) cv. Arka Pratham" was carried out at the Experimental Field, Department of Floriculture and Landscaping, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during Rabi 2024-25. The experiment consisted of fifteen treatments for weed control: Treatments *viz*. Pendimethalin PE (960 g/ha), Pendimethalin PE fb imazethapyr + imazamox (960 fb 70 g/ha) at 30 DAP (PoE), Pendimethalin PE fb oxyfluorfen (960 fb 200 g/ha) at 30 DAP (PoE), Pendimethalin PE fb propaquizafop + imazethapyr (960 fb 125 g/ha) at 30 DAP (PoE), Pendimethalin PE fb hand weeding at 30 DAP, Pendimethalin PE fb hand weeding at 30 and 60 DAP, Diuron PE (75 g/ha), Diuron PE fb imazethapyr + imazamox (75 fb 70 g/ha) at 30 DAP (PoE), Diuron PE fb oxyfluorfen (75 fb 200 g/ha) at 30 DAP (PoE), Diuron PE fb propaquizafop + imazethapyr (75 fb 125 g/ha) at 30 DAP (PoE), Diuron PE fb hand weeding at 30 DAP, Diuron PE fb hand weeding at 30 and 60 DAP, three hand weeding at 20, 40 and 60 DAP farmers practice, plastic mulch and weedy check. The field experiment was laid out in Randomized Block Design (RBD) with three replications. The plots treated with pre-emergence herbicides i.e. Pendimethalin, diuron and hand weeding significantly reduced the weed population at early stage of crop growth as compared to weedy check and other treatment. Weed population and dry weight of weed accumulation were significantly reduced by plastic mulch and Diuron PE fb Propaquizafop + Imazethapyr PoE at 30 DAP and Pendimethalin PE fb propaquizafop + imazethapyr PoE at 30 DAP, while the highest weed infestation was observed in the weedy check. weed control efficiency was highest in Diuron PE fb Propaquizafop + Imazethapyr PoE at 30 DAP closely followed by plastic mulch across 30, 60 and 90 DAP, whereas weedy check recorded zero weed control efficiency.

Keywords: Gladiolus, weed management, herbicidal treatment, diuron, pendimethalin, imazethapyr, imazamox, propaquizafop, oxyfluorfen

1. Introduction
Flowers are wonderful creation of God and one of most beautiful gift of nature to human. They are used to express the feelings of love, joy, sorrow and happiness because they have the power to make us happy and cheerful on different occasion like marriage, valentine day, birthday, etc. Different kind and types of flowers are used by people on different occasions and it stands for strength and moral integrity. Gladiolus (*Gladiolus grandiflorus* L.) belongs to family *Iridaceae* with chromosome number n=15 and native of South Africa and Tropical Africa. The name gladiolus was originally coined by Pliny the Elder (A.D.23-79), from the Latin word *gladius*, meaning a sword, also known as 'Sword lily'. Gladiolus was introduced to India during 19th century (Apte, 1958) [1]. It is referred as "Queen of bulbous flowers" crop, due to its magnificent inflorescence, brilliant colours, attractive shapes, varying sizes, straight and considerably hardy spike with long vase life are desirable characteristics.
In India, gladiolus are categorized as butterflies, miniatures, doubles (having more than six petals), giants and huge flowered. It is common cut flower in both domestic and foreign trade. Many flower lovers are drawn to spikes because of their extraordinary beauty and variety of colours and hues. It is cultivated commercially for the production of cut flowers or corms/cormels (Kadam *et al*. 2014) [5].

2. Materials and Methods

An experiment was conducted to study the Effect of different weed management practices on weed dynamics of gladiolus (*Gladiolus grandiflorus* L.) cv. Arka Pratham at experimental field, Department of Floriculture and Landscaping, Dr. PDKV, Akola in rabi 2024-2025. The experiment encompassed fifteen treatments. The experiment was laid out in Randomized Block Design (RBD) having three replications. Pre and post emergence weedicides were applied before and 30 DAP respectively. Hand weeding was carried out at 20, 40 and 60 DAP and plastic mulch was applied before planting of corms.

2.1 Weed density

The total weed flora was divided into two main groups i.e. monocot and dicot weeds**.** Total number of weeds presented in a experimental plots were counted with the help of quadrates one square meter and weed density was recorded. All the weeds present in the experimental plots were classified under three major group (i) Grasses (ii) Sedges and (iii) Broad leaved weeds. The weed parameters were counted at 30, 60 and 90 DAP and the average was worked out.

2.2 Dry weight of weeds (g)

After collecting the weeds from individual treatments. weed samples were kept for drying in oven at 60 °C for 72 hours. After complete drying, the dry weight of weeds was recorded for different treatments.

2.3 Weed control efficiency (WCE)

The weed control efficiency was calculated on the basis of reduction in dry weight of weed in treated plot in comparison with the control plot and expressed in percentage.

Where,
WCE = Weed control efficiency
DWC = Dry weight of weeds in weedy check plot
DWT = Dry weight of weeds in treated plot

3. Results and Discussion

3.1 Effect of different weed management practices on weed flora of gladiolus

Weed flora observed during the crop period of gladiolus was categorized as grasses, sedges and broadleaved weeds. Observations were recorded on weed count per square meter area, dry weight of weeds, weed control efficiency at 30 days interval. Among the grasses, *Cynodon dactylon* was predominant. The only sedge observed was *Cyperus rotundus* and *Cyperus esculentus* other predominant species of weeds observed are as below.

Table 1: List of weeds observed in experimental field during crop period

Sr. No	Botanical Name	Common Name	Life cycle	Family
Grasses				
1	*Cynodon dactylon*	Bermuda grass	Perennial	Poaceae
Sedges				
2	*Cyperus rotundus*	Purple nut sedge	Perennial	Cyperaceae
3	*Cyperus esculentus*	Yellow nut sedge	Perennial	Cyperaceae
Broad leaved weeds				
4	*Euphorbia hirta*	Garden spurge	Annual	Euphorbiaceae
5	*Ageratum conyzoides*	Billgoat weed	Annual	Asteraceae
6	*Amaranthus viridis*	Janglichaulai	Annual	Amaranthaceae
7	*Parthenium hysterophorus*	Congrees grass	Annual	Asteraceae
8	*Portulaca oleraceae*	Purslane	Annual	Portulacaceae
9	*Trianthema portulacastrum*	Desert horse purslane	Annual	Aizoaceae
10	*Tridax procumbens*	Ekdandi	Annual	Asteraceae
11	*Chenopodium album*	Bathhua	Annual	Chenopodiaceae
12	*Cleome viscosa*	Asian spiderflower	Annual	Capraceae
13	*Commelina benghalensis L*	Kena	Annual	Commelinaceae

3.2 Monocot weeds (per m^2)

All other treatments where pre-emergence weedicide was applied weed count ranging from 6.00 to 8.67 was recorded. These treatments were statistically similar to each other. At 30 DAP, minimum weed count (3.00/m^2) was recorded in treatment T_{14} where plastic mulch was used. This treatment was statistically similar to T_{13} where three hand weeding were done at 20, 40 and 60 DAP. Which recorded weed count of (5.33) per square meter. Maximum weed count i.e.41.33 per square meter was recorded in treatment T_{15} (weedy check)

At 60 DAP, minimum weed count (4.67/m^2) was observed in plastic mulch (T_{14}), which was statistically similar to plastic mulch (T_{14}), T_{10} (Diuron PE fb propaquizafop + imazethapyr PoE at 30 DAP), T_4 (pendimethalin PE fb propaquizafop + Imazethapyr PoE at 30 DAP), T_{13} (Three hand weeding at 20, 40 and 60 DAP), T_8 (Diuron PE fb imazethapyr + imazamox PoE at 30 DAP) and T_2 (pendimethalin PE fb imazethapyr + imazamox PoE at 30 DAP) which recorded weed count per square meter of 6.67, 7.67, 8.00, 8.67 and 10.67 respectively. Maximum weed count i.e. 64.00 m^2 was recorded in treatment T_{15} i.e. (weedy check)

At 90 DAP, minimum weed count (6.33/m^2) was recorded in treatment (T_{14}) i.e. plastic mulch, this treatment was followed by and statistically similar to (T_{10}) Diuron PE fb propaquizafop + imazethapyr PoE at 30DAP, (T_4) pendimethalin (PE) fb propaquizafop + imazethapyr PoE at 30 DAP, (T_{13}) Three hand weeding at 20, 40 and 60 DAP and (T_8) Diuron (PE) fb Imazethapyr + Imazamox PoE at 30 DAP which recorded weed count per square meter of 9.67, 11.33, 12.00, 13.33 respectively. Maximum weed count i.e. 77.00 m^2 was recorded in weedy check T_{15}, this treatment was statistically different from all the other treatment.

Overall, among the various treatments, Plastic mulch (T_{14}) consistently recorded the minimum monocot weed count at 30, 60 and 90 DAP. This might be due to the physical barrier created by mulch, which suppressed weed seed

germination and emergence. The application of pre-emergence herbicides which provided good control of monocot weed at early stages of crop growth. Among herbicidal treatments, Diuron (PE) fb propaquizafop + imazethapyr PoE at 30DAP (T_{10}) proved most effective in reducing monocot weeds throughout the growth stages. Weedy check (T_{15}) recorded maximum weed population at all stages. Similar findings were reported by, Varsha *et al*. (2018) [10] in cotton, Kumar *et al*. (2020) [6] and Jenkins *et al*. (1967) [4] in gladiolus

3.3 Dicot weeds (per m^2)

All other treatment where pre-emergence weedicide was applied weed count ranging from 2.00 to 5.67 was recorded. At 30 DAP, minimum weed count (2.00/m^2) was recorded in treatment (T_{10}) where Diuron (PE) fb propaquizafop + imazethapyr PoE at 30DAP and treatment (T_8) where Diuron (PE) fb Imazethapyr + Imazamox PoE at 30DAP was applied, this treatment was statistically similar to (T_9) Diuron (PE) fb Oxyfluorfen PoE at 30DAP, which recorded weed count of 2.00, 2.33 per square meter. Maximum weed count i.e. 28.00/m^2 was recorded in treatment T_{15} (Weedy check)

At 60 DAP, minimum weed count (2.33/m^2) was observed in (T_{14}) i.e. plastic mulch. This treatment was statistically similar to (T_{10}) Diuron (PE) fb propaquizafop + imazethapyr PoE at 30 DAP, T_4 (pendimethalin (PE) fb propaquizafop + imazethapyr PoE at 30 DAP), T_{13} (three hand weeding at 20, 40 and 60 DAP) which recorded weed count of 2.33, 3.33, 5.00 per square meter respectively. Maximum weed count i.e. 36.33 m^2 was recorded in treatment T_{15} i.e. (weedy check)

At 90 DAP, minimum weed count (4.67/m^2) was recorded in treatment (T_{14}) i.e. plastic mulch, this treatment was followed by and statistically similar to (T_{10}) Diuron (PE) fb propaquizafop + imazethapyr PoE at 30 DAP. (T_{13}) i.e. Three hand weeding at 20, 40 and 60 DAP and T_8 Diuron (PE) fb (Imazethapyr + Imazamox PoE at 30 DAP) which recorded weed count per square meter of 9.00, 12.33, 13.33 respectively. Maximum weed count i.e.54.00/m^2 was recorded in weedy check.

Plastic mulch (T_{14}) consistently recorded the lowest dicot weed count at 60 DAP and 90 DAP, followed by Diuron (PE) fb Propaquizafop + Imazethapyr PoE at 30 DAP (T_{10}) and Diuron (PE) fb Imazethapyr + Imazamox PoE at 30 DAP (T_8). Weedy check (T_{15}) recorded the highest dicot weed population at all growth stages. The effectiveness of plastic mulch and sequential post-emergence herbicides may be attributed to sustained suppression of weed germination and growth during the cropping period, thereby reducing crop weed competition. Similar results were recorded by Shivashenkaramurthy *et al*. (2020) [7] in banana and Kumar *et al*. (2020) [6] in gladiolus.

3.4 Total weeds (per m^2)

At 30 DAP, all other treatments where pre-emergence weedicide was applied weed count ranging from 8.00 to 16.00 was recorded. Minimum weed count (6.33/m^2) was recorded in treatment T_{14} where plastic mulch was applied, this was statistically similar to T_{10} where Diuron (PE) fb propaquizafop + imazethapyr PoE was applied at 30 DAP, which recorded weed count of (8.00/m^2), T_8 where (Diuron PE fb Imazethapyr + Imazamox PoE applied at 30 DAP) weed count per square meter of 8.67 was recorded. Maximum weed count i.e. 69.33 m^2 was recorded in treatment T_{15} (Weedy check)

At 60 DAP, minimum weed count (7.00 m^2) was observed in (T_{14}) i.e. plastic mulch. This treatment was superior over all treatments where pre-emergence weedicide was applied after planting and followed by post emergence weedicide at 30 DAP, as well as treatment of hand weeding. Treatment of Plastic mulch (T_{14}) was statistically similar to T_{10} (Diuron PE fb propaquizafop + imazethapyr PoE was applied at 30 DAP) which recorded weed count of (9.00) per square meter. Maximum weed count i.e. 100.33 m^2 was recorded in treatment T_{15} i.e. (weedy check).

At 90 DAP, minimum weed count (11.00/m^2) was recorded in treatment (T_{14}) i.e. plastic mulch. This treatment was followed by T_{10} (Diuron PE fb propaquizafop + imazethapyr PoE at 30 DAP), which recorded weed count of 18.67/m^2. Maximum weed count i.e. 131.00 m^2 was recorded in weedy check, this treatment was statistically different from all the other treatment.

Among the various treatments, Plastic mulch (T_{14}) consistently recorded lowest total weed population at 30, 60 and 90 DAP, which might be due to complete suppression of weed emergence. Among the herbicidal treatments, Diuron (PE) fb propaquizafop + imazethapyr PoE at 30 DAP (T_{10}) and Diuron (PE) fb Imazethapyr + Imazamox PoE at 30 DAP (T_8) were most effective throughout the crop growth period. This might be due to combination of both herbicides that have longer effect on controlling weed population. The post emergence herbicide propaquizafop + imazethapyr PoE at 30 DAP showed better effect on many broad leaf and grasses weed. Total weed population was reduced significantly due to various weed control treatments at all stages of crop growth. This might be due to the herbicidal application alone and in combination which were effective in timely reducing total weed population. Weedy check (T_{15}) recorded highest weed population, Similar results were also reported by Bhaskar *et al*. (2020) [2] in gladiolus and Mangaraj *et al*. (2021) in pigeon pea.

3.5 Dry weight of weed

At 30 DAP, minimum weed dry weight (0.31 g/m^2) was recorded in treatment (T_{10}) where Diuron (PE) fb propaquizafop + imazethapyr PoE at 30 DAP was applied, which was statistically similar to treatment T_{14} (Plastic mulch), T_8 (Diuron PE fb imazethapyr + imazamox PoE at 30 DAP), T_9 (Diuron PE fb oxyfluorfen PoE at 30 DAP), T_{11} (Diuron PE fb Hand weeding at 30 DAP) which recorded dry weed weight g/m^2 of 0.52, 0.66, 0.75, 0.86 respectively. The maximum weed dry weight i.e. (7.77 g/m^2) was recorded in treatment T_{15} (weedy check).

At 60 DAP, minimum weed dry weight (0.31 g/m^2) was observed in T_{10} i.e. Diuron (PE) fb propaquizafop + imazethapyr PoE applied at 30 DAP, this treatment was superior over all the treatment where pre-emergence weedicide was applied after planting and followed by post emergence weedicides at 30 DAP, as well as treatment of hand weeding. This treatment was statistically similar to T_{14} i.e. application of plastic mulch and T_4 pendimethalin (PE) fb propaquizafop + imazethapyr PoE at 30 DAP which recorded weed dry weight of (0.70 and 1.05 g/m^2). Maximum weed dry weight i.e. 22.12 g/m^2 was recorded in treatment T_{15} i.e. (weedy check)

Table 2: Effect of different weed control treatment on weed density

Treatment		Weed count/m²								
		Monocot weed			Dicot weed			Total weed		
		30 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP
T_1	Pendimethalin PE (960 g/ha)	8.33 (2.97)	30.00 (5.49)	53.33 (7.31)	5.33 (2.41)	14.33 (3.85)	24.67 (4.97)	13.67 (3.76)	44.33 (6.67)	78.00 (8.86)
T_2	Pendimethalin PE fb imazethapyr + imazamox (960 fb70 g/ha) at 30 DAP (PoE)	8.00 (2.91)	10.67 (3.24)	16.67 (4.10)	5.00 (2.35)	7.67 (2.78)	22.67 (4.81)	13.00 (3.67)	18.33 (4.33)	39.33 (6.29)
T_3	Pendimethalin PE fb oxyfluorfen (960 fb200 g/ha) at 30 DAP (PoE)	8.00 (2.90)	12.00 (3.53)	22.00 (4.71)	3.33 (1.93)	8.67 (3.00)	22.00 (4.73)	11.33 (3.44)	20.67 (4.59)	44.00 (6.67)
T_4	Pendimethalin PE fb propaquizafop + imazethapyr (960 fb 125 g/ha) at 30 DAP (PoE)	8.00 (2.83)	7.67 (2.83)	11.33 (3.42)	4.00 (2.11)	3.33 (1.93)	16.67 (4.04)	12.00 (3.49)	11.00 (3.36)	28.00 (5.31)
T_5	Pendimethalin PE fb Hand weeding at 30 DAP	7.00 (2.71)	14.67 (3.86)	36.33 (6.01)	4.67 (2.26)	9.67 (3.14)	22.67 (4.75)	11.67 (3.47)	24.33 (4.93)	59.00 (7.69)
T_6	Pendimethalin PE fb Hand weeding at 30 DAP and 60 DAP	8.67 (2.85)	17.00 (4.16)	19.00 (4.32)	5.67 (2.46)	6.33 (2.59)	21.67 (4.70)	13.67 (3.69)	23.33 (4.88)	40.67 (6.40)
T_7	Diuron PE (75 g/ha)	7.33 (2.74)	20.00 (4.43)	37.00 (6.09)	3.33 (1.93)	11.33 (3.40)	24.33 (4.97)	10.67 (3.32)	31.33 (5.60)	61.33 (7.85)
T_8	Diuron PE fb imazethapyr + imazamox (75 fb 70 g/ha) at 30 DAP (PoE)	6.67 (2.62)	8.67 (3.00)	13.33 (3.65)	2.00 (1.56)	6.33 (2.58)	13.33 (3.68)	8.67 (2.97)	15.00 (3.90)	26.67 (5.20)
T_9	Diuron PE fb oxyfluorfen (75 fb 200 g/ha) at 30 DAP (PoE)	7.00 (2.73)	11.33 (3.44)	18.67 (4.33)	2.33 (1.68)	7.33 (2.75)	14.00 (3.80)	9.33 (3.13)	18.67 (4.36)	32.67 (5.72)
T_{10}	Diuron PE fb propaquizafop + imazethapyr (75 fb 125 g/ha) at 30 DAP (PoE)	6.00 (2.55)	6.67 (2.67)	9.67 (3.18)	2.00 (1.58)	2.33 (1.68)	9.00 (3.06)	8.00 (2.91)	9.00 (3.07)	18.67 (4.37)
T_{11}	Diuron PE fb Hand weeding at 30 DAP	7.00 (2.70)	11.00 (3.34)	30.67 (5.56)	3.33 (1.93)	9.67 (3.07)	19.00 (4.34)	10.33 (3.29)	20.67 (4.55)	49.67 (7.07)
T_{12}	Diuron PE fb Hand weeding at 30 and 60 DAP	7.67 (2.80)	12.67 (3.61)	17.33 (4.20)	3.00 (1.81)	5.67 (2.47)	20.33 (4.54)	10.67 (3.31)	18.33 (4.32)	37.67 (6.18)
T_{13}	Three hand weeding at 20, 40 and 60 DAP (farmers practice)	5.33 (2.40)	8.00 (2.86)	12.00 (3.50)	7.67 (2.80)	5.00 (2.23)	12.33 (3.56)	16.00 (4.03)	13.00 (3.67)	24.33 (4.96)
T_{14}	Plastic mulch	3.00 (1.86)	4.67 (2.27)	6.33 (2.59)	3.33 (1.94)	2.33 (1.64)	4.67 (2.22)	6.33 (2.61)	7.00 (2.73)	11.00 (3.38)
T_{15}	Weedy check	41.33 (6.27)	64.00 (8.01)	77.00 (8.77)	28.00 (5.06)	36.33 (6.03)	54.00 (7.36)	69.33 (8.04)	100.33 (10.01)	131.00 (11.44)
SE m±		0.38	0.36	0.44	0.38	0.32	0.37	0.47	0.29	0.32
CD (5%)		1.12	1.05	1.27	1.11	0.94	1.08	1.37	0.86	0.93

Table 3: Effect of different weed control treatments on dry weight of weed and weed control efficiency percentage

Treatment		Dry weight of weed (g/m²)			Weed control efficiency (%)		
		30 DAP	60 DAP	90 DAP	30 DAP	60 DAP	90 DAP
T_1	Pendimethalin PE (960 g/ha)	1.98 (1.56)	10.65 (3.31)	14.53 (3.86)	74.51	51.85	79.01
T_2	Pendimethalin PE fb imazethapyr + imazamox (960 fb70 g/ha) at 30 DAP (PoE)	1.81 (1.51)	1.90 (1.52)	4.70 (2.26)	76.7	91.41	93.21
T_3	Pendimethalin PE fb oxyfluorfen (960 fb200 g/ha) at 30 DAP (PoE)	1.77 (1.50)	2.15 (1.61)	6.37 (2.62)	77.22	90.28	90.80
T_4	Pendimethalin PE fb propaquizafop + imazethapyr (960 fb 125 g/ha) at 30 DAP (PoE)	1.12 (1.26)	1.05 (1.24)	3.73 (2.05)	85.58	95.25	94.61
T_5	Pendimethalin PE fb Hand weeding at 30 DAP	1.18 (1.26)	3.47 (1.99)	9.37 (3.13)	84.81	84.31	86.46
T_6	Pendimethalin PE fb Hand weeding at 30 DAP and 60 DAP	1.93 (1.52)	2.76 (1.79)	5.20 (2.38)	75.16	87.52	92.49
T_7	Diuron PE (75 g/ha)	1.58 (1.41)	7.13 (2.76)	10.84 (3.36)	79.66	67.76	84.34
T_8	Diuron PE fb imazethapyr + imazamox (75 fb 70 g/ha) at 30 DAP (PoE)	0.66 (1.06)	1.78 (1.51)	4.54 (2.24)	91.50	91.95	93.44
T_9	Diuron PE fb oxyfluorfen (75 fb 200 g/ha) at 30 DAP (PoE)	0.75 (1.11)	1.51 (1.41)	5.40 (2.42)	90.34	94.07	92.20
T_{10}	Diuron PE fb propaquizafop + imazethapyr (75 fb 125 g/ha) at 30 DAP (PoE)	0.31 (0.88)	0.31 (1.05)	3.35 (1.95)	96.01	98.59	95.16
T_{11}	Diuron PE fb Hand weeding at 30 DAP	0.86 (1.15)	1.62 (1.44)	8.32 (2.97)	88.93	92.67	87.98
T_{12}	Diuron PE fb Hand weeding at 30 and 60 DAP	1.89 (1.54)	1.94 (1.55)	4.73 (2.28)	75.67	91.22	93.16
T_{13}	Three hand weeding at 20, 40 and 60 DAP (farmers practice)	2.13 (1.60)	1.30 (1.34)	4.45 (2.21)	72.58	94.12	93.57
T_{14}	Plastic mulch	0.52 (1.01)	0.70 (1.07)	1.06 (1.25)	93.30	96.83	98.46
T_{15}	Weedy check	7.77 (2.86)	22.12 (4.69)	69.25 (8.31)	0	0	0
SE m±		0.15	0.19	0.20	-	-	-
CD (5%)		0.44	0.56	0.57	-	-	-

At 90 DAP, minimum weed dry weight (1.06 g/m^2) was recorded in treatment T_{14} i.e. Plastic mulch, this treatment was followed by T_{10} Diuron (PE) fb propaquizafop + imazethapyr PoE at 30 DAP. which recorded weed dry weight of 3.35 g/m^2. Maximum weed dry weight i.e. 69.25 g/m^2 was recorded in weedy check (T_{15})

Overall, the treatment Plastic mulch (T_{14}) consistently recorded the lowest weed dry weight at 30, 60 and 90 DAP which might be due to complete suppression of weed emergence and weed growth. While among the various herbicidal weed control treatments, minimum weed dry weight per square meter observed with Diuron (PE) fb propaquizafop + imazethapyr PoE at 30 DAP (T_{10}) and (T_4) i.e. Pendimethalin (PE) fb propaquizafop + imazethapyr PoE at 30 DAP are highly effective for weed control in gladiolus. Weedy check (T_{15}) consistently recorded the highest weed dry weight throughout the crop growth stages due to absence of weed management practices. Similar result were reported by Panda *et al*. (2017) [9] in soyabean, Muhammed *et al*. (2017) [8] in okra and Bhaskar *et al*. 2020 [2] in gladiolus.

3.6 Weed control efficiency (%)

All other treatment where pre-emergence weedicide was applied weed control efficiency ranging from 96.01 to 72.58% was observed At 30 DAP, higher weed control efficiency (96.01%) was recorded in treatment Diuron (PE) fb propaquizafop + imazethapyr PoE at 30 DAP (T_{10}) which was followed by T_{14} i.e. plastic mulch which recorded 93.30% weed control efficiency. Weedy check (T_{15}) recorded the lowest weed control efficiency.

At 60 DAP, all the weed control treatments recorded higher weed control efficiency than weedy check. Among all the treatment, Diuron (PE) fb propaquizafop + imazethapyr PoE at 30 DAP (T_{10}) recorded higher weed control efficiency (98.59%) followed by (T_{14}) i.e. plastic mulch which recorded weed control efficiency of 96.83%. T_{15} i.e. (Weedy check) recorded the lowest weed control efficiency.

At 90 DAP, the treatment of plastic mulch (T_{14}) recorded highest weed control efficiency (98.46%) and it was followed by (T_{10}) Diuron (PE) fb propaquizafop + imazethapyr PoE at 30 DAP (95.16%) and T_4 (pendimethalin (PE) fb propaquizafop + imazethapyr PoE at 30 DAP) 94.61% whereas, weedy check the lowest weed control efficiency respectively.

The lowest weed control efficiency (0% at 30, 60 and 90 DAP) was observed in treatment weedy check due to poor or no control of weeds. All other treatments recorded higher weed control efficiency due to lower dry weight of weeds as compared to weedy check. The variability in weed densities in different treatments can be attributed to the fact that some herbicides are more effective for weed control than others. Among the herbicidal treatments, Diuron (PE) fb Propaquizafop + Imazethapyr (PoE) at 30 DAP (T_{10}) followed by T_4 (Pendimethalin (PE) fb propaquizafop + imazethapyr PoE at 30 DAP) recorded the highest weed control efficiency. The superior performance of these sequential herbicide applications could be attributed to the extended spectrum of weed control, targeting both grasses and broad leaf weeds, thereby reducing weed competition over a prolonged period. Similar result were reported by Panda *et al*. (2017) [9] and Ekka *et al*. (2024) [3] in soyabean, Kumar *et al*. 2020 [6] in gladiolus

4. Conclusion

Plastic mulch proved to be the most effective practice for weed suppression in gladiolus, recording the lowest weed population, dry weight of weed and highest weed control efficiency. Among herbicidal treatments, Diuron (PE) fb Propaquizafop + Imazethapyr PoE at 30 DAP was superior in reducing both monocot and dicot weeds with prolonged control and (Pendimethalin (PE) fb propaquizafop + imazethapyr PoE at 30 DAP) and Three hand weeding at 20, 40 and 60 DAP also proved effective in minimizing weed density and maintaining better crop growth, though it was more labour-intensive. In contrast, the weedy check consistently recorded the highest weed population. Hence, plastic mulch as a non-chemical option, Diuron (PE) fb Propaquizafop + Imazethapyr PoE at 30 DAP, (Pendimethalin (PE) fb propaquizafop + imazethapyr PoE at 30 DAP) as a chemical option and three hand weeding as a traditional method effective weed management in gladiolus**.**

5. References

1. Apte SS. Kieming van *Gladiolus* kralen (Spouting of *Gladiolus* corms). Meded Dir Juing. 1958;21:749-753.
2. Bhaskar M, Kumar S, Jha MK. Effect of weed control method on *Gladiolus grandiflorus* L. cv. American Beauty on weed growth. Pharma Innov J. 2020;9(4):165-169.
3. Ekka S, Savu RM, Tiwari N, Gupta V, Sushank S, Kumar PGS, Mahobia R, Narayan D. Effect of post-emergence herbicides on weed dynamics and yield of soybean [*Glycine max* (L.) Merrill]. Int J Res Agron. 2024;7(8):227-230.
4. Jenkins JM Jr, Chambers EE, McGee FG. Chemical weed control in *Gladiolus*. Weed Sci. 1967;16(1):86-88.
5. Kadam GB, Kumar G, Taraknathsaha RK, Tiwari AK, Kumar R. Evaluation of pre-emergence herbicides in *Gladiolus*. Indian J Agric Sci. 2014;84(12):1546-1549.
6. Kumar D, Chahal D, Punia SS, Malik A. Phytotoxic effect of herbicides on *Gladiolus* and their effectiveness against weed flora associated with the crop. Pharma Innov J. 2020;9(11):95-102.
7. Shivashenkaramurthy AA, Rs PMM, Neeralagi A. Effect of diuron herbicide on weeds in banana. J Pharmacogn Phytochem. 2020;9:930-934.
8. Muhammed UP, Sindhu PV, Thomas CG. Organic mulches for weed management in homesteads. Indian Hortic J. 2017;7(1):94-96.
9. Panda S, Kewat ML, Saini MK. Efficacy of propaquizafop and imazethapyr mixture against weeds in soybean. Int J Curr Microbiol Appl Sci. 2017;6(10):3251-3256.
10. Varsha N, Madhavi M, Ramprakash T, Suneetha Devi KB. Efficacy of diuron along with sequential application of herbicides for weed control in cotton. Int J Curr Microbiol Appl Sci. 2018;7(6):34-39.