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Effect of different weed management practice on qualitative and vegetative parameters of turf grass under Chhattisgarh plains condition

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Abstract

The present investigation conducted at Thakur Chhedilal College of Agriculture and Research Station in Bilaspur Chhattisgarh during the year 2021-2023. The experiment was conducted in factorial randomized complete block design (FRCBD). Highest scored variety for aesthetic appearance was Tifdwarf, highest turf colour score obtained by treatment nine, maximum turf density, highest canopy height found under treatment nine, highest fresh clipping yield and dry clipping yield observed under C₁W₅. investigation was carried out with two turf grass variety viz. "Tifdwarf" and *Zoysia japonica* and six Weed Management practices W₁- Weedy check, W₂- Soil Solarization, W₃- Pendimethalin 1.0 kg ha⁻¹ PE fb HW 50 and 75 DAP, W₄- Metsulfuron methyl 4 g ha⁻¹ + sulfosulfuron 25 g ha⁻¹ (20 to 25 DAP) fb HW 50 and 75 DAP, W₅- Pendimethalin 1.0 kg ha⁻¹ + Metsulfuron 4 g ha⁻¹ + sulfosulfuron 25 g ha⁻¹ (20 to 25 DAP) one HW 75 DAP and W₆- Weed free (three HW 20,40 and 60 DAP) with three replication and twelve treatment combination.

Keywords: Qualitative, "Tifdwarf", vegetative, weed management and *Zoysia japonica*

Introduction

Turf grasses can endure regular cutting of the shoots and have a limitless growth potential, forming a continuous ground cover and assuring a lush green, high-quality lawn.

Locations with direct sunlight are best for Bermuda grass which is a most popular turf grass. They may thrive in humid, semiarid, tropical, subtropical, and warm temperate climates around the globe. The use of Bermuda grass has significantly risen due to the possibility for water savings and other attractive attributes that meet today's demands for turf grass and environmental concerns (Keeley and Fagerness 2001) [7]. More than 600 genera of turf grasses make up the 7500 species that make up the Gramineae family. The centrepiece of any landscape and a necessary component of any garden is the lawn. Any lawn must be properly installed and maintained in order to be healthy and appear its best (Randhawa and Mukhopadhyay, 1986) [9].

On the basis of climatic requirements, grasses are categorized into two major groups first one is cool season grasses and second one is warm season grasses. Warm season grasses come under C₄ plants, that is the reason behind more adaptability of warm season grasses under high temperature and humidity. Warm season grasses dormant over winter season and grow maximum as summer increases and growth is on peak on mid summer on April-May on cg plains condition.

Warm season grasses: These grasses thrive in temperatures between 25 and 35 degrees Celsius. example: *Zoysia* grass (*Zoysia* species), Bermuda grass (*Cynodon* species), St. Augustine grass (*Paspalum* species), centipede grass (*Eremachloa*), carpet grass (*Axonopus*), buffalo grass, and grama grass (De, 2013) [3]. The two most significant warm-season turf grasses in the southern region and transition zone of the United States are bermudagrass (*Cynodon dactylon* (L.) and *Zoysia* grass (*Zoysia japonica* Steud.)

Material and Methods

The present investigation conducted at Thakur Chhedilal College of Agriculture and Research Station, Bilaspur, Chhattisgarh, entitled, "Weed management in Warm Season Turf grasses under Chhattisgarh Plains condition," from 2021 to 2023.

Data presented here are from Observation of two consecutive years.

Turf grass variety	
C ₁	<i>Cynodon dactylon</i> × <i>C. transvaalensis</i> var. 'Tifdwarf'
C ₂	<i>Zoysia japonica</i>
Weed management practices	
W ₁	Weedy check
W ₂	Soil Solarisation
W ₃	Pendimethalin 1.0 kg ha ⁻¹ PE fb HW 50 and 75 DAP
W ₄	Metsulfuron methyl 4 g ha ⁻¹ + sulfosulfuron 25 g ha ⁻¹ (20 to 25 DAP) fb HW 50 and 75 DAP
W ₅	Pendimethalin 1.0 kg ha ⁻¹ + Metsulfuron 4 g ha ⁻¹ + sulfosulfuron 25 g ha ⁻¹ (20 to 25 DAP) one HW 75 DAP
W ₆	Weed free (three HW 20,40 and 60 DAP)

Result and Discussions

Turf colour

During previous year in the month March and May 'Tifdwarf' reported the dark green color with highest score (8.11 and 8.40 respectively) and lowest score obtained by *Zoysia japonica* shows comparatively less green colour (7.66 and 8.01 respectively). Among weed management practices W₅ was the best and showed dark lush green colour turf (8.65 and 8.96 respectively) followed by W₃ (8.15 and 8.45 respectively) whereas control plot (W₁) was lighter in shade (7.15 and 7.05 respectively). Interaction significant affect on turf colour and Treatment nine T₉ (C₁W₅) exhibited dark green colour lawn with highest score (9.00 and 9.00 respectively), whereas treatment two T₂ (C₂W₁) which is a control plot was showing light green colour lawn (6.90 and 6.80 respectively).

During second year in the month of March and May 'Tifdwarf' scored maximum (8.12 and 8.14 respectively) whereas least score obtained by *Zoysia japonica* (7.70 and 7.98 respectively). In weed management practices darkest colour turf obtained under W₅ (8.68 and 8.93 respectively) whereas control (W₁) with no weed management practices had lightest turf colour (7.10 and 6.26 respectively). Highest Interaction effect with highest score turf colour (C₁W₅) observed under T₉ (9.00 and 9.00 respectively) whereas T₂ (C₂W₁) was much lighter than T₉ (7.10 and 6.53 respectively). Agnihotri *et al.* (2017)^[1], Geren *et al.* (2009)^[5] find similar result in their investigation.

Turf density

During first year highest turf density was scored by 'Tifdwarf' (8.16 and 8.02 respectively) while the lowest turf density was noted in *Zoysia japonica* (7.92 and 7.88 respectively). Among weed management practices W₅ exhibited highest turf density (8.53 and 8.73 respectively) whereas W₁ had lowest turf density (7.23 and 6.55 respectively). Interaction significantly affect on turf density where T₉ (C₁W₅) exhibited highest turf density (8.83 and 8.86 respectively) while T₂ (C₂W₁) resulted lowest turf density (7.20 and 6.53 respectively).

During second year, 'Tifdwarf' scored maximum turf density (8.40 and 8.14 respectively) whereas least rating occupied by *Zoysia japonica* (8.01 and 7.98 respectively). Among weed management practices highest turf density obtained under W₅ (8.96 and 8.93 respectively) while lowest turf density (7.05 and 6.40 respectively) under control condition (W₁). Highest interaction effect found under T₉ (C₁W₅) with highest turf density (9.00 and 9.00 respectively) Whereas T₂ (C₂W₁)

reported lowest turf density (6.80 and 6.26 respectively). The result are in conformity with Malik *et al.* (2014)^[8].

Turf aesthetic appearance

During previous year highest aesthetic appearance reported in 'Tifdwarf' (7.43 and 6.30 respectively) while lowest aesthetic appearance noted in *Zoysia japonica* (6.74 and 5.80 respectively). Among weed management practices W₅ exhibited highest aesthetic appearance (8.18 and 7.12 respectively) whereas control plot (W₁) resulted the lowest aesthetic appearance (6.07 and 5.17 respectively). Interaction between grasses and weed management practices had significant effect on aesthetic appearance where T₉ (C₁W₅) exhibited highest aesthetic appearance (8.47 and 7.93 respectively) while T₂ (C₂W₁) which is a control plot resulted lowest aesthetic appearance (5.60 and 4.83 respectively).

During second year 'Tifdwarf' scored maximum for aesthetic appearance (8.11 and 8.29 respectively) whereas least score obtained by *Zoysia japonica* (7.38 and 7.87 respectively). Among weed management practices highest aesthetic appearance obtained under W₅ (8.78 and 8.88 respectively) while lowest appearance (6.38 and 7.28 respectively) under control condition (W₁). Interaction between grasses and weed management practices had significantly affect the turf aesthetic appearance. T₉ (C₁W₅) reported highest aesthetic appearance (9.00 and 9.00 respectively) whereas T₂ (C₂W₁) reported lowest aesthetic appearance (5.76 and 7.06 respectively). Similar findings obtained by Agnihotri *et al.* (2017)^[1].

Fresh clipping yield (g/100 cm²)

During Fifty day after planting at the time of first mowing in both year lowest fresh clipping yield (174.15 and 180.52 respectively) recorded under *Zoysia japonica* whereas highest fresh clipping yield was recorded under cultivar tifdwarf (218.88 and 214.18 respectively). Among weed management practices lowest fresh clipping yield (117.53 and 126.02 respectively) was reported under control plot (W₁) whereas highest fresh clipping yield (330.68 and 284.54 respectively) was recorded under W₅. Highest Interaction effect with maximum fresh clipping yield (401.13 and 308.68 respectively) recorded under treatment nine (C₁W₅) while lowest fresh clipping yield (112.27 and 124.60 respectively) recorded under T₂ (*Zoysia* dibbled on control plot) C₂W₁.

During 100 DAP at the time of second mowing in both years lowest fresh clipping yield (202.89 and 244.30 respectively) was recorded under *Zoysia japonica* whereas highest fresh clipping yield was recorded under cultivar tifdwarf (273.58 and 262.58 respectively). Among weed management practices lowest fresh clipping yield (170.13 and 192.23 respectively) was reported under control plot (W₁) whereas highest fresh clipping yield (362.25 and 325.12 respectively) was recorded under W₅. Interaction effect found highest with Highest fresh clipping yield under T₉ (455.40 and 371.50 respectively) while minimum fresh clipping yield was found under C₂W₁ (157.47 and 189.96 respectively).

Treatment nine, where Pendimethalin 1.0 kg ha⁻¹ + Metsulfuron 4 g ha⁻¹ + sulfosulfuron 25 g ha⁻¹ (20 to 25 DAP) one HW 75 DAP applied on tifdwarf found highest fresh clipping yield and Similar observations was reported by Agnihotri *et al.* (2017)^[1], Wadekar *et al.* (2018)^[10].

Dry clipping yield (g/100 cm²)

During Fifty day after planting at the time of first mowing and

after drying of clippings lowest dry clipping yield in both years (31.38 and 37.03 respectively) was recorded under *Zoysia japonica* while highest dry clipping yield (65.40 and 63.81 respectively) was recorded under C₁ (tifdwarf). Among weed management practices lowest dry clipping yield (29.27 and 32.25 respectively) reported under control plot (W₁) whereas highest dry clipping yield (68.47, 67.68 and 68.07 respectively) was recorded under W₅. Interaction effect found highest with Highest dry clipping yield (92.27 and 86.30 respectively) was recorded under treatment nine (T₉) whereas Lowest dry clipping yield (18.57 and 22.80 respectively) was recorded at T₂ (C₂W₁). During 100 DAP lowest dry clipping yield (44.45 and 45.28 respectively) was recorded under *Zoysia japonica* whereas

highest dry clipping yield recorded under cultivar tifdwarf (81.95 and 82.42 respectively). Among weed management practices lowest dry clipping yield (43.53 and 48.36 respectively) resulted under control plot (W₁) whereas highest fresh clipping yield (85.56 and 84.65 respectively) observed under W₅. Interaction effect found highest dry clipping yield under T₉ (118.73 and 114.50 respectively) while Minimum dry clipping yield found under C₂W₁ (38.56 and 40.60 respectively).

The result revealed that significantly highest root length found under treatment nine (Pendimethalin 1.0 kg ha⁻¹ + Metsulfuron 4 g ha⁻¹ + sulfosulfuron 25 g ha⁻¹ (20 to 25 DAP) one HW 75 DAP) and the result are in conformity with Duncan, 1971^[4].

Table 1: Effect of different weed management practices on Qualitative parameters of turf grasses under Chhattisgarh plains condition

Treatments		Turf colour rating (March)		Turf colour rating (May)		Turf density rating (March)		Turf density rating (May)		Turf aesthetic appearance rating (March)		Turf aesthetic appearance rating (March)	
		2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23
Turf variety (C)													
C ₁	Tifdwarf	8.11	8.12	8.40	8.14	8.16	8.02	8.40	8.14	7.43	6.30	8.11	8.29
C ₂	<i>Z. japonica</i>	7.66	7.70	8.01	7.98	7.92	7.88	8.01	7.98	6.74	5.80	7.38	7.87
SE(m)		0.02	0.03	0.03	0.05	0.03	0.02	0.03	0.05	0.06	0.12	0.04	0.04
C.D. at 5%		0.07	0.09	0.10	0.14	0.10	0.08	0.10	0.14	0.18	0.36	0.13	0.13
Weed Management Practices (W)													
W ₁		7.15	7.10	7.05	6.40	7.23	6.55	7.05	6.40	6.07	5.17	6.38	7.28
W ₂		7.46	7.51	7.68	7.28	7.83	7.78	7.68	7.28	6.51	5.48	7.02	7.85
W ₃		8.15	8.21	8.45	8.58	8.41	8.45	8.45	8.58	7.68	6.28	8.56	8.32
W ₄		8.15	8.05	8.45	8.50	8.26	8.13	8.45	8.50	6.80	6.17	8.26	7.93
W ₅		8.65	8.68	8.96	8.93	8.53	8.73	8.96	8.93	8.18	7.12	8.78	8.88
W ₆		7.75	7.90	8.65	8.68	8.00	8.10	8.65	8.68	7.27	6.08	7.45	8.22
SE(m)		0.04	0.05	0.06	0.08	0.06	0.04	0.06	0.08	0.11	0.22	0.07	0.06
C.D. at 5%		0.13	0.16	0.18	0.25	0.17	0.14	0.18	0.25	0.31	0.63	0.22	0.23
Interaction		S	S	S	S	S	S	S	S	S	S	S	S

Note: Pooled data from 2021-2023

Table 2: Interaction effect of grasses and weed management practices on Qualitative parameters of turf grasses under Chhattisgarh plains condition

Treatments		Turf colour rating (March)		Turf colour rating (May)		Turf density rating (March)		Turf density rating (May)		Turf aesthetic appearance rating (March)		Turf aesthetic appearance rating (March)	
		2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23
T ₁	C ₁ W ₁	7.30	7.20	7.30	6.26	7.26	6.56	7.30	6.53	6.53	5.50	7.00	7.50
T ₂	C ₂ W ₁	6.90	7.10	6.80	6.53	7.20	6.53	6.80	6.26	5.60	4.83	5.76	7.06
T ₃	C ₁ W ₂	7.46	7.53	7.90	7.30	7.86	7.76	7.90	7.30	6.63	5.56	7.40	7.96
T ₄	C ₂ W ₂	7.46	7.50	7.46	7.26	7.80	7.80	7.46	7.26	6.38	5.40	6.63	7.73
T ₅	C ₁ W ₃	8.30	8.40	8.80	8.90	8.53	8.60	8.80	8.90	8.13	6.37	8.85	8.80
T ₆	C ₂ W ₃	8.00	8.03	8.10	8.26	8.30	8.30	8.10	8.26	7.23	6.20	8.27	7.85
T ₇	C ₁ W ₄	8.40	8.30	8.50	8.60	8.36	8.26	8.50	8.60	7.10	6.27	8.60	8.07
T ₈	C ₂ W ₄	7.90	7.80	8.40	8.40	8.16	8.00	8.40	8.40	6.50	6.07	7.93	7.78
T ₉	C ₁ W ₅	9.00	9.00	9.00	9.00	8.83	8.86	9.00	9.00	8.47	7.93	9.00	9.00
T ₁₀	C ₂ W ₅	8.30	8.36	8.93	8.86	8.23	8.60	8.93	8.86	7.70	6.30	8.57	8.77
T ₁₁	C ₁ W ₆	8.20	8.30	8.90	8.80	8.13	8.13	8.90	8.80	7.70	6.17	7.80	8.40
T ₁₂	C ₂ W ₆	7.30	7.50	8.40	8.56	7.86	8.06	8.40	8.56	6.83	6.00	7.10	8.03
SE(m)		0.06	0.07	0.08	0.12	0.08	0.06	0.08	0.12	0.15	0.31	0.10	0.12
C.D. at 5%		0.19	0.22	0.26	0.35	0.24	0.19	0.26	0.35	0.44	0.90	0.31	0.33

Table 3: Effect of different weed management practices on vegetative growth of turf grasses under Chhattisgarh plains condition

Treatments	Fresh clipping yield 50 DAP		Fresh clipping yield 100 DAP		Dry clipping yield 50 DAP		Dry clipping yield 100 DAP		
	2021-22	2022-23	2021-22	2022-22	2021-22	2022-23	2021-22	2022-23	
Turf variety (C)									
C ₁	Tifdwarf	218.88	214.18	273.58	262.58	65.40	63.81	81.95	82.42
C ₂	<i>Z. japonica</i>	174.15	180.52	202.89	244.3	31.38	37.03	44.45	45.28
	SE(m)	1.22	1.78	2.30	1.83	1.03	1.001	1.23	0.91
	C.D. at 5%	3.51	5.14	6.65	5.29	2.96	2.96	3.62	2.68
Weed Management Practices (W)									
W ₁		117.53	126.02	170.13	192.23	29.27	32.25	43.53	48.36
W ₂		123.93	131.27	175.82	204.62	32.93	37.60	52.61	55.46
W ₃		247.25	246.27	272.63	278.78	62.43	60.83	74.65	73.45
W ₄		212.78	198.58	227.05	258.88	55.75	56.25	66.91	65.26
W ₅		330.68	284.54	362.25	325.12	68.47	67.68	85.56	84.65
W ₆		146.90	199.53	221.53	261.18	41.48	47.93	55.91	55.95
	SE(m)	2.11	3.09	4.00	3.18	1.78	1.73	2.12	1.57
	C.D. at 5%	6.08	8.91	11.52	9.17	5.12	5.11	6.27	4.64
	Interaction	S	S	S	S	S	S	S	S

Note: Pooled data from 2021-2023

Table 4: Interaction effect of grasses and weed management practices on vegetative growth of turf grasses under chhattisgarh plains condition

Treatments	Fresh clipping yield 50 DAP		Fresh clipping yield 100 DAP		Dry clipping yield 50 DAP		Dry clipping yield 100 DAP		
	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	2021-22	2022-23	
T ₁	C ₁ W ₁	122.80	127.43	182.80	194.50	39.97	41.70	48.50	56.13
T ₂	C ₂ W ₁	112.27	124.60	157.47	189.96	18.57	22.80	38.56	40.60
T ₃	C ₁ W ₂	130.40	134.40	192.50	207.73	45.13	50.00	61.50	60.46
T ₄	C ₂ W ₂	117.47	128.13	159.13	201.50	20.73	25.20	43.73	50.46
T ₅	C ₁ W ₃	276.40	268.20	319.00	286.03	80.75	77.23	102.73	103.90
T ₆	C ₂ W ₃	218.10	224.33	226.27	271.53	44.10	44.43	46.65	43.00
T ₇	C ₁ W ₄	220.33	224.97	244.13	256.56	75.17	70.86	91.23	89.03
T ₈	C ₂ W ₄	205.23	172.90	209.96	261.50	36.33	41.63	42.60	41.50
T ₉	C ₁ W ₅	401.13	308.68	455.40	371.50	92.27	86.30	118.73	114.50
T ₁₀	C ₂ W ₅	260.23	260.40	269.10	278.73	44.67	49.06	52.40	54.80
T ₁₁	C ₁ W ₆	162.20	225.63	247.63	259.43	59.10	56.80	69.00	70.53
T ₁₂	C ₂ W ₆	131.60	173.43	195.43	262.93	23.87	39.06	42.83	41.37
	SE(m)	2.66	4.37	5.65	4.50	2.52	2.45	3.007	2.23
	C.D. at 5%	8.61	12.61	16.30	12.96	7.25	7.24	8.87	6.57

Conclusion

Highest aesthetic appearance, Darkest Lush green turf colour, highest turf density, highest fresh clipping yield and dry clipping yield observed under variety "Tifdwarf" whereas among weed management practices, practice having Pendimethalin 1.0 kg ha⁻¹ + Metsulfuron 4 g ha⁻¹ + sulfosulfuron 25 g ha⁻¹ (20 to 25 DAP) one HW 75 DAP resulted best. Interaction effect found highest under treatment nine where tifdwarf treated with W₅.

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