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Kachhadiya SP
Associate Research Scientist,
Main Oilseeds Research Station,
Junagadh Agricultural University,
Junagadh, Gujarat, India

Vora JR
Department of Agronomy,
College of Agriculture,
Junagadh Agricultural University,
Junagadh, Gujarat, India

Gajera JB
Ph.D. Student, Department of Agronomy, College of Agriculture,
Junagadh Agricultural University,
Junagadh, Gujarat, India

Corresponding Author:
Gajera JB
Ph.D. Student, Department of Agronomy, College of Agriculture,
Junagadh Agricultural University,
Junagadh, Gujarat, India

Assessing the effectiveness and evolution of pre and post-emergence herbicides in weed management for coriander (*Coriandrum sativum* L.)

Kachhadiya SP, Vora JR and Gajera JB

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Abstract
In the winter season of 2019-20, a field study titled Evaluation of the efficacy and development of pre and post-emergence herbicides in the control of weeds in coriander (*Coriandrum sativum* L.) cultivation' was conducted at the Instructional Farm, Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh. The experiment comprising 12 treatments was laid out in randomized block design with 3 replications. The results revealed that next to the weed free treatment, significantly higher values of growth parameters *viz.*, plant height, number of branches per plant and days to 50% flowering and yield and yield attributes *viz.*, number of umbels per plant, number of umbellates per umbel, number of seeds per umbellate, test weight, seed yield, straw yield, biological yield and harvest index were recorded with pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS and it was at par with Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS. Besides, weed free condition, Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS were found more effective in reducing the weed population up to harvest and resulted in less weed count dry weight of weeds, lower weed index and higher weed control efficiency. Economical evaluation showed that the highest net return of ₹ 26801/ha and BCR of 2.02 was obtained with the treatment Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS followed by the treatment Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS.

Keywords: Coriander, weed, hand weeding, herbicide, pre and post-emergence herbicide

Introduction
Coriander, a significant spice crop, is a member of the Umbelliferae family and native to the Mediterranean region. Its flavor and aroma enhance the pleasure of eating, making it a vital part of the human diet. In addition to India, coriander is planted commercially in Morocco, Romania, France, Spain, Italy, Netherlands, Myanmar, Pakistan, Turkey, Mexico, Argentina, some amount in the UK and USA. India is the world's biggest producer of coriander, which is mostly grown in the states of Tamil Nadu, Orissa, Gujarat, Rajasthan, Andhra Pradesh, and Karnataka. Together, the Indian states of Gujarat and Rajasthan account for over 80% of the nation's output of seed spices, earning them the moniker "seed spices bowl" of India.

In 2019-20, total 6.28 lakh hectares area covered by coriander with 7,56,000 MT productions. In Gujarat coriander occupies 86,175 hectares area with total production of 1,29,150 MT. (Anon., 2020). Coriander is a popular herb for flavoring food, with its thin stems, bushy shape, and pleasant aroma. Its fruit is globular, 3-4 mm in diameter, with delicate seeds. There are two types: erect and bushy, with a stronger main shoot.

Coriander is a cool season crop that thrives in 20-25 °C temperatures and prefers frost-free conditions. It is primarily cultivated in kitchen gardens for green leaves. It thrives in rich, well-drained soils, with loamy soil being ideal for cultivation. Coriander's aromatic odor makes it popular in preparing chutneys, sauces, and condiments. Its seeds are also used in ayurvedic medicines and are used in volatile oil and oleoresins, which are in high demand in international markets.

Coriander leaves and seeds are rich in vitamins, minerals, and protein, with fiber, carbohydrates, fatty oil, and protein being the main constituents. The seeds are rich in fatty oil and essential oil. Coriander leaves are used in various foods like chutneys, salads, and soups, while seeds are used

as animal feed. The leaves spoil quickly when removed and lose their aroma when dried or frozen. The mature fruits are used for flavouing purposes, with the stem having little use. Coriander has been used in various cultures for various purposes, including medicine and food. Raw coriander leaves are 92% water, 4% carbohydrates, 2% protein, and less than 1% fat, while seeds have a different nutritional profile, providing more vitamins, fiber, calcium, and iron.

Weeds, unwanted plants competing for nutrients, water, sunlight, and space with crops, pose a significant constraint to crop production. They emerge simultaneously with crops, establish earlier, and suppress plant growth, reducing yields. Most dominant weeds are found in dicots and monocots.

Among the various factor known to augment the crop production, the weed management is the key factor. Coriander crop is very sensitive to early weed competition. Uncontrolled weed can reduce about 20-50% coriander seed yield (Nagar *et al*., 2009) [9]. In Saurashtra region mostly *Chenopodium* spp., *Digera arvensis* (Dicot weed) are and *Cyperus rotundus* (Sedge weed) are mostly found.

Manual weeding in coriander is time-consuming and labor-intensive due to high labor charges and shifting agricultural labor to industries. Repeated operations can cause physical damage and are not economically feasible in intensive agriculture. Chemical weed control is reported to be more effective. Cultivators often lack knowledge about proper herbicide dose, application time, economics, and persistence in soil. Selective herbicides are available, and farmers must make decisions for optimal weed control in Saurashtra region.

Materials and Methods

The experiment entitled "Assessing the effectiveness and evolution of pre and post-emergence herbicides in weed management for coriander (*Coriandrum sativum* L.)" was conducted during *rabi* season of the year 2019-20. The experiment was conducted in D-5 plot of Instructional Farm, Department of Agronomy, College of Agriculture, Junagadh Agricultural University, Junagadh during *rabi* 2019-20. Geographically, Junagadh is situated at 21°29'48'' N latitude and 70°26'29" E longitude with an altitude of 60 m above the mean sea level. The experimental soil was clayey in texture (sand 22.57%, silt 13.54% and clay 63.89%) and slightly alkaline in reaction with pH 8.0 and EC 0.57 dS m^{-1}. It was medium in available nitrogen (276 kg ha^{-1}), medium in available phosphorus (33 kg ha^{-1}) and medium in available potash (281 kg ha^{-1}).

January is the coldest month of winter. Summer season commences during the second fortnight of February and ends by middle of June. April and May are the hottest months of summer. Total rainfall received during crop growing season was 0.0 mm. The range of average sun shine, and evaporation was 3.2-9.1 hours and 3.1-7.6 mm, respectively. Proposed coriander cultivar Gujarat Coriander-2 is high yielding and recommended for south saurastra agroclimatic zone conditions. Gujarat Coriander-2 variety developed by Seed Spices Research Station, SDAU, Jagudan and released in the year 1982. Proposed variety have medium height and average yield 1400 kg/ha.

The experiment comprising of total twelve treatments *viz.*, of T_1 (Pendimethalin 900 g/ha as PE *fb* HW at 30 DAS), T_2 (Oxyflurofen 180 g/ha as PE *fb* HW at 30 DAS), T_3 (Oxadiargyl 75 g/ha as PE *fb* HW at 30 DAS), T_4 (Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS), T_5 (HW at 15 DAS *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS), T_6 (HW at 15 DAS *fb* metribuzin 300 g/ha as PoE at 30 DAS), T_7 (Tank mix of pendimethalin 450 g/ha as PE + oxyflurofen 90 g/ha as PE *fb* HW at 30 DAS), T_8 (Tank mix of pendimethalin 450 g/ha as PE + oxadiargyl 37.5 g/ha as PE *fb* HW at 30 DAS), T_9 (Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS), T_{10} (HW at 15 and 30 DAS), T_{11} (Weed free) and T_{12} (Weedy check) was laid out in randomized block design with three replications.

The coriander (*cv*. Gujarat Coriander 2) was sown on Last week of November 2019 at a spacing of 30 cm using seed rate of 12 kg/ha. The gross plot size was 5.0 m × 2.4 m and net plot size was 4.0 m × 1.8 m. The crop was harvested at maturity on 4th March, 2020. All the herbicide were applied with manually operate knapsack sprayer fitted -1 with flood jet nozzle at a spray volume of 500 l/ha. Weed count were recorded at 30 DAS, 60 DAS and at harvest and were subjected to square root transformation, while dry weight of weeds was recorded at harvest. Weed index (WI) and weed control efficiency (WCE) were worked out using following formulae suggested by Gill and Kumar (1969) [3] and Kondap and Upadhyay (1985) [5].

$$WI = \frac{Y_{WF} * Y_T}{Y_{WF}}$$

Where, Y_{WF} and Y are the yield from weed-free plot T and yield from treated plot, respectively.

$$WCE(\%) = \frac{DW_C - DW_T}{DW_C} * 100$$

Where, DW = Dry matter accumulation of weeds in C unweeded control, DW = Dry matter accumulation of T weeds in treated plot.

Results and Discussion

Weed flora

The experimental field was infested with monocot weeds *viz*., *Asphodelus tenuifolius* Cav., *Brachiaria* spp., *Echinocloa colonam* (L.) and *Cynodon dactylon* L. and dicot weeds *viz*., *Parthenium hysterophorus* L., *Digera arvensis* Forsk, *Euphorbia hirta* L., *Portulaca oleracea* L., *Parthenium hysterophorus* L., *Chenopodium album* L., *Launaea nudicaulis* L., *Phyllanthus niruri* L., and sedge weed *Cyperus rotundus* L.

Effect of on growth

An examination of the data (Table 1) found that the treatment weed free (T_{11}) significantly enhanced growth and yield attributes *viz*., plant height, number of branches at harvest, number of Umbels per plant, number of umbellate per umbel and number of seeds per umbellate and ultimately increased seed yield (kg/ha), straw yield (kg/ha) and biological yield (kg/ha), however it was found statistically at par with the treatments Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS (T_9) in all characters and Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS (T_4) is at par except biological yield.

Among the different weed management treatments, treatment Weed free (T_{11}) higher plant height at harvest (52.50 cm) was recorded but, it was statistically at par with treatments Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS (T_4), Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS (T_9) and HW at 15 and 30 DAS (T_{10}). Treatment Weedy check (T_{12}) recorded significantly the lowest plant height of (38.69 cm).

Treatment Weed free(T_{11}) recorded significantly the highest number of branches per plant (9.10) but, it was statistically at par with treatments Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS (T_9) and Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS (T_4). Treatment Weedy check(T_{12}) recorded significantly the lowest plant spread (15.00 cm).

The higher values of growth parameters *viz*., plant height and number of branches at harvest were registered under treatments weed free (T_{11}), Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS (T_4) and Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS (T_9). This was due to resulting in decreased crop-weed competition throughout the crop's development cycle. boosted water and nutrient intake may have enhanced photosynthetic rate and boosted glucose supply, resulting in cell division, multiplication, and elongation, leading to growth characteristics. These findings were in agreement with those of (Kumar Nagar and Kumar Jain, 2017) [6], Meena and Mehta (2009) [8], Roy *et al.* (2013) [10] and Mathukia *et al.* (2018) [7].

Effect on yield attributes and yield

The weed management practices exhibited their significant influence on number of umbels per plant. The maximum umbels per plant (8.60) were significantly produced with treatment T_{11} (Weed free) but it was statistically at par with treatment T_9 (Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS) and T_4 (Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS). While, weedy check (T_{12}) recorded significantly the lowest no. of umbel per plant (4.87).

An appraisal of data (Table 1) indicated that significant influence on number of umbellate per umbel and number of seeds per umbellate. The maximum umbellate per umbel and number of seeds per umbellate were significantly produced with treatment T_{11} (Weed free) but it was statistically at par with treatment T_9 (Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS) and T_4 (Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS). While, weedy check (T_{12}) recorded significantly the lowest no. of umbellate per umbel.

The seed yield of coriander significantly influenced due to the different weed management practices tried in this experiment. Weed free (T_{11}) gave a maximum seed yield (1221 kg/ha) but it was statistically at par with treatment T_9 (Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS) and T_4 (Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS). While, weedy check (T_{12}) recorded significantly the lowest seed yield (575 kg/ha).

The effect of different treatments was found significant on straw yield of coriander. Treatment T_{11} (weed free) recorded significantly higher straw yield (1813 kg/ha), but it was statistically at par with treatment T_9 (Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS), T_4 (Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS) and T_5 (HW at 15 DAS *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS). While, Treatment T_{12} (Weedy check) was found significantly the lowest straw yield (946 kg/ha).

Table 1: Growth and yield of coriander under different weed management treatments

Treatment	Plant height at harvest (cm)	No. of branches at harvest	Number of Umbels per plant	Number of umbellate per umbel	Number of seeds per umbellate	Seed yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)
T_1	47.67	6.87	6.30	4.47	4.53	872	1330	2203
T_2	48.72	7.30	7.40	4.87	4.93	904	1358	2262
T_3	47.92	7.36	6.80	4.60	5.00	894	1387	2282
T_4	49.94	8.17	7.83	5.07	5.80	1003	1543	2546
T_5	49.07	7.9	6.87	4.73	5.33	995	1510	2505
T_6	43.43	5.07	6.13	4.07	4.60	785	1195	1979
T_7	48.81	7.23	7.27	4.83	5.13	864	1311	2175
T_8	49.01	7.46	7.40	4.60	5.20	891	1377	2268
T_9	51.42	8.36	8.27	5.13	5.93	1037	1611	2649
T_{10}	50.04	8.07	7.47	4.47	5.27	992	1490	2482
T_{11}	52.50	9.10	8.60	5.27	6.20	1221	1813	3034
T_{12}	38.69	4.33	4.87	4.00	3.67	575	946	1521
S.Em.±	1.12	0.34	0.36	0.21	0.26	74	105	166.9
CD at 5%	3.39	0.99	1.06	0.62	0.77	218	308	439.38
C.V. %	8.45	8.13	8.86	7.84	8.89	14	13	12.42

The biological yield of coriander was significantly influenced due to various treatments of weed management. Among them treatment T_{11} (weed free) recorded significantly higher biological yield (3034 kg/ha), but it was statistically at par with treatment T_9 (Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS) and T_4 (Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS). While, Treatment T_{12} (Weedy check) was found significantly the lowest biological yield (1521 kg/ha).

The increased yields under these treatments might be attributed to a reduction in crop-weed competition, since the plant would not be stressed by nutrients, hydration, light, or space. These assisted the plant in setting optimum growth parameters. Furthermore, it may have increased photosynthetic activity and assimilate partitioning, resulting in better yield qualities, which were positively connected with seed production, and clearly resulted in higher seed yield under the treatments listed above. Weedy check or unweeded control (T_{12}) produced significantly lower seed and straw yields. Poor yields might be attributed to the crop's stunted growth and development under unweeded management due to intense crop-weed competition for resources. The current findings are closely related to those published by Panchal *et al*. 2014 [10], Savaliya (2017) [14] and Mathukia *et al*. (2018) [7].

Effect on weed attributes

Different weed management treatments manifested their significant effect on weed count recorded at 30 DAS, 60 DAS and at harvest (Table 2). All the weed management treatments significantly reduced the weed population compared to weedy

check (T_{12}). Next to the weed free (T_{11}), the treatment T_9 (Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS) recorded significantly the lowest population of monocot, dicot and sedge weeds, followed by the treatment T_4 (Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS) and T_5 (HW at 15 DAS *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS). Dry weight of weeds was significantly influenced due to different weed management practices (Table 2). Besides the weed free (T_{11}), the lowest dry weight of weeds was observed under the treatment T_9 (Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS), though it was found statistically at par with the treatment T_4 (Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS) followed by T_5 (HW at 15 DAS *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS). Significantly the highest dry weight of weeds was observed under the treatment T_{12} (Weedy check). This might be attributed to the effective control of weeds under these treatments, which reflected in less number of weeds and ultimately lower weed biomass. In addition to this, dense crop canopy might have suppressed weed growth and ultimately less biomass. The weedy check (T_{12}) recorded significantly the highest dry weight of weeds owing to uncontrolled condition favoured luxurious weed growth leading to increased weed dry matter. These findings are in close conformity with those reported by Yadav *et al.* (2013) [16], Hassanein *et al.* (2020) [4] and (Prajapati *et al*. 2021) [12]

A perusal of data presented in table 2 indicates that besides the weed free (T_{11}), lowest WI and maximum WCE was obtained under the treatment T_9 (T_9 (Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS) recorded significantly, followed by the treatment T_4 (Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS) and T_5 (HW at 15 DAS *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS). This might be due to elimination of weeds by manual pre and post emergence herbicides and weeding. The combined effect on dry weight of weeds and seed yield under these treatments might have been responsible for excellent weed indices. These findings are in close conformity with those reported by Shukla *et al*. 2003, Yadav *et al.* (2013) [16], Patil *et al*. 2020) [11] and Hassanein *et al.* (2020) [4].

Table 2: Effect of different weed management treatments on monocot, dicot and sedge weeds count of coriander

Treatments	Monocot weeds (0.36 m^2)				Dicot weed (0.36 m^2)				Sedge weed (0.36 m^2)				Dry weight of weeds (kg/ha)	Weed index (%)	Weed control efficiency (%)
	20 DAS	40 DAS	60 DAS	At harvest	20 DAS	40 DAS	60 DAS	At harvest	20 DAS	40 DAS	60 DAS	At harvest			
T_1	2.14 (4.33)	2.35 (5.33)	2.91 (8.00)	3.18 (9.67)	2.11 (4.00)	2.47 (5.67)	2.73 (7.00)	2.96 (8.33)	1.56 (2.00)	1.85 (3.00)	2.11 (4.00)	2.48 (5.67)	456	28.52	65.94
T_2	2.02 (3.67)	2.47 (5.67)	2.60 (6.33)	2.72 (7.00)	1.93 (3.33)	2.35 (5.33)	2.60 (6.33)	3.01 (8.67)	1.46 (1.67)	1.77 (2.66)	2.037 (3.67)	2.60 (6.33)	416	25.91	69.00
T_3	2.09 (4.00)	2.28 (5.00)	2.76 (7.33)	2.76 (7.33)	2.03 (3.66)	2.67 (6.67)	2.85 (7.67)	3.11 (9.33)	1.55 (2.00)	1.77 (2.66)	2.19 (4.33)	2.44 (5.67)	492	26.73	63.25
T_4	1.85 (3.00)	1.90 (3.33)	2.09 (4.00)	2.34 (5.00)	1.76 (2.67)	1.94 (3.33)	2.38 (5.33)	2.47 (5.67)	1.26 (1.33)	1.46 (1.66)	1.81 (3.00)	2.12 (4.00)	315	17.80	76.47
T_5	1.89 (3.33)	2.26 (4.67)	2.18 (4.33)	2.60 (6.33)	1.93 (3.33)	2.24 (4.67)	2.44 (5.67)	2.79 (7.33)	1.44 (1.67)	1.55 (2.00)	1.93 (3.33)	2.44 (5.67)	381	18.51	71.62
T_6	2.06 (4.00)	2.83 (7.67)	3.06 (9.00)	3.29 (10.33)	2.02 (3.67)	2.96 (8.33)	3.29 (10.33)	3.84 (14.33)	1.55 (2.00)	1.95 (3.33)	2.19 (4.33)	3.07 (6.00)	754	35.71	43.76
T_7	2.25 (4.67)	2.63 (6.67)	2.96 (8.33)	2.85 (7.67)	2.03 (3.67)	2.27 (4.67)	2.47 (5.67)	2.91 (8.00)	1.34 (1.33)	1.67 (2.33)	2.04 (3.67)	2.48 (5.67)	435	29.19	67.59
T_8	1.93 (3.33)	2.56 (6.33)	3.02 (8.67)	3.07 (9.00)	2.11 (4.00)	2.33 (5.00)	2.65 (6.67)	2.96 (8.33)	1.46 (1.67)	1.76 (2.66)	2.11 (4.00)	2.35 (5.33)	508	27.00	62.07
T_9	1.64 (2.67)	1.77 (2.67)	2.01 (3.67)	2.18 (4.33)	1.67 (2.33)	1.85 (3.00)	2.24 (4.67)	2.40 (5.33)	1.17 (1.00)	1.38 (1.66)	1.77 (2.67)	1.95 (3.33)	258	15.02	80.73
T_{10}	2.02 (3.67)	2.02 (3.67)	2.72 (7.00)	2.65 (6.67)	2.11 (4.00)	2.33 (5.00)	2.67 (6.67)	2.83 (7.67)	1.34 (1.33)	1.55 (2.00)	1.85 (3.00)	2.33 (5.00)	361	18.70	73.03
T_{11}	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)	0.70 (0.00)	00	0.00	100.00
T_{12}	3.19 (9.67)	3.98 (15.33)	4.97 (24.33)	5.37 (28.33)	3.43 (11.33)	4.12 (16.67)	4.70 (21.67)	5.07 (25.33)	1.94 (3.33)	2.19 (4.33)	2.56 (6.33)	3.57 (12.33)	1339	52.92	0.00
S.Em.±	0.20	0.23	0.19	0.14	0.15	0.17	0.15	0.16	0.17	0.23	0.19	0.22	33	-	-
CD at 5%	0.61	0.69	0.56	0.43	0.45	0.50	0.46	0.49	0.52	0.68	0.56	0.66	95	-	-

Note: Figures in the parenthesis indicates the square root transformed value.

Effect on economics

The economics of different herbicides used in coriander are presented in Table 3. Among different treatments, Treatment T_9 (Pendimethalin 900 g/ha as PE *fb* quizalofop ethyl 70 g/ha as PoE at 30 DAS) recorded lower cost of cultivation (₹ 24586 /ha) and higher gross return (₹ 51387 /ha) and net returns (₹ 26801/ha) as well as benefit cost ratio (2.09) due to higher weed control efficiency with no phytotoxic effect on the crop. Similar results were recorded from Dhakad *et al*. (2017) [2]. However, it was followed by Paraquat 500 g/ha at 7 DAS as EPoE *fb* HW at 30 DAS (T_4). Whereas, the lowest cost-benefit ratio of 1.42 was recorded from a weedy check.

Table 3: Effect of various weed management treatments on economics

Treatments	Gross return (₹/ha)	Cost of cultivation (₹/ha)	Net return (₹/ha)	BCR
T_1	43186	25531	17655	1.69
T_2	44749	25814	18935	1.73
T_3	44299	25303	18996	1.75
T_4	49687	24640	25047	2.02
T_5	49270	26208	23062	1.87
T_6	38875	25193	13682	1.54
T_7	42783	26241	16542	1.63
T_8	44145	25558	18587	1.72
T_9	51387	24586	26801	2.09
T_{10}	49106	27438	21668	1.78
T_{11}	60405	38538	21867	1.56
T_{12}	28546	20037	8509	1.42

Conclusion

Based on the results of one year experimentation, it can be concluded that effective and economically viable weed management in coriander can be achieved by applying Pendimethalin 900 g/ha as pre-emergence followed by quizalofop ethyl 70 g/ha as post-emergence at 30 days after sowing OR Paraquat 500 g/ha at 7 DAS as early post-emergence followed by hand weeding at 30 days after sowing OR adopting hand weeding at 15 and 30 days after sowing.

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