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Short Communication

Bio-efficacy of GOD H007 formulation in semi-temperate undulating pasture lands of Himachal Pradesh

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Abstract

A field experiment was conducted during *kharif* 2019 at the Research Farm of Department of Agronomy, College of Agriculture CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, to study the bio efficacy of new herbicide for managing weeds in undulating pasture land pockets. The experiment was laid out in Randomised Block Design with three replications, and consisted of seven weed control treatments including GOD H007 at 860, 882 and 903 g/ha, pyrithiobac sodium 62.5 g/ha, glyphosate 820 g/ha, hand weeding and a weedy check. Application of this new herbicide combination product GOD H007 903 g/ha though remaining statistically alike with glyphosate 820 g/ha, resulted in significantly lowest total weed density and total weed dry matter at all the stages of observation except that at 30 days after spray (DAS) at which hand weeding proved to be a superior treatment. These three treatments interventions also recorded higher weed control efficiency. However, significantly highest fresh and dry herbage yield at 60 DAS was recorded with the application of pyrithiobac sodium 62.5 g/ha. Application of this new herbicide GOD H007 903 g/ha showed promise to be effective for managing weeds in pasture land.

Key words: GOD H007, weed control, pasture land.

Weeds are offensive plants that obstruct the growth of desired plant species and human interests at a particular place and time. Open areas around inhabitations, lawns, orchards, tea gardens, pastures and pastureland, those are not extensively resorted to inter-cultivation, are also included in the category of non-cropped land (Rana *et al.* 2015). Weeds can reduce the quantity and the stand life of desirable forage plants in pastures. These unwanted plants are often more aggressive than existing or desired forage species and compete for light, water, and nutrients. In later stages of maturity, weeds can also reduce the quality and palatability of the forage available for livestock grazing. However, not all weedy plants are detrimental to pastures. In the early vegetative stage of growth, many weeds have nutritive values which may be in certain cases equal to or greater than the desired forages. However, the forage qualities of weeds decline rapidly as the plants mature. All over the world non-cropped land is reported to be infested heavily with perennial weeds that endure hardship to control them. In Himachal Pradesh non-cropped land occupies about 80% of the geographical area due to unique physiographical features of the state (Rana *et al.* 2015). Glyphosate and paraquat are most commonly used herbicides in the non-cropped areas to free them from obnoxious vegetation. However, newer products are required to be developed and recommended to broaden the spectrum of weed control especially so when some of the in-use herbicides are facing eminent bans by union government. GOD HOO7 64.5 % Soluble Grains (SG) is a combination of glyphosate 40 % and pyrithiobac sodium 3% SG. Active ingredients of these herbicides inhibit the plant enzymes acetolactate synthase (ALS) and 5-enolpyruvylshikimate-3-phosphate synthase (EPSPS) which are needed for protein synthesis. These non-selective post-emergence herbicides control a wide range of non-cropped land weeds. In view of the above facts, application of new herbicides for safe, effective and economical control of weeds at the active growth stage of weeds in non-cropped land is imperative.

A field investigation was carried out at the Experiment Farm of Department of Agronomy of

CSKHPKV, Palampur (32° 6' N, 76° 3'E) during *kharif* 2019. The experimental site was an established partureland, the soil of which was silty clay loam in texture, acidic in reaction (pH 5.6), low in available nitrogen (235 kg/ha), and medium in available phosphorus (16.9 kg/ha) and potassium (198 kg/ha). Seven weed control treatments consisting of *three* doses of this new herbicide GOD H007 903 g/ha, 882 g/ha, 860 g/ha, pyrithiobac sodium 62.5 g/ha, glyphosate 820 g/ha, one hand weeding and weedy check were tested in Randomized Block Design with three replications. Herbicides were applied using 600 liters of water/ha with a flat fan nozzle attached to a Knapsack sprayer as per schedule. Weed count and weed dry weight were recorded from two spots using a quadrate of 50 x 50 cm and expressed as number and g/m^2, respectively. The data on weed count and weed dry weight were subjected to square root transformation ($\sqrt{x+0.5}$).

Weed control efficiency was calculated as per formula given by Mishra and Tosh (1979).

$$\text{Weed control efficiency (\%)} = \frac{\text{DWC} - \text{DWT}}{\text{DWC}} \times 100$$

Where: DWC- Weed Dry Weight (g/m^2) in control plot and

DWT- Weed Weight (g/m^2) in treated plot

The dominant weed flora in the experimental area consisted of *Imperata cylindrica, Plantago lanceolata*, *Phylanthus niruri*, *Erigeron canadensis, Cynodon dactylon, Trifolium repens, Ageratum conyzoides* and *Cerastium fountanum*. Similar type of flora has been observed by Angiras (2014) in pasturelands under mid hill condition of Himachal Pradesh. Different weed control treatments significantly influenced the total weed density at different stages of observations (Table 1). Significantly lowest total weed count at 15 days

Table 1. Effect of weed control treatments on total weed count (No./m^2) in pastureland

Treatment	Dose (g/ha)	Stages of Observation				
		Before Spray	15DAS	30DAS	45DAS	60DAS
GOD H007 64.5% SG	860	15.33 # (234.67)	11.73 (137.33)	11.68 (136.00)	12.96 (168.00)	15.33 (234.67)
GOD H007 64.5% SG	882	14.71 (216.00)	9.75 (94.67)	10.02 (100.00)	11.19 (125.33)	14.06 (197.33)
GOD H007 64.5% SG	903	14.93 (222.67)	8.18 (66.67)	8.33 (69.33)	9.69 (94.67)	12.11 (146.67)
Pyrithiobac sodium 10% EC	62.5	14.48 (209.33)	15.32 (234.67)	17.60 (309.33)	20.04 (401.33)	20.43 (417.33)
Glyphosate 41% SL	820	15.40 (237.33)	11.04 (122.67)	8.89 (78.67)	10.28 (105.33)	12.67 (160.00)
Hand weeding	-	16.50 (272.00)	5.89 (34.67)	10.97 (120.00)	14.02 (196.00)	17.44 (304.00)
Weedy check	-	14.32 (205.33)	16.89 (285.33)	18.85 (354.67)	22.10 (488.00)	23.64 (558.67)
SEm±		0.41	0.53	0.28	0.46	0.33
LSD (P=0.05)		1.26	1.62	0.87	1.43	1.01

Values in parentheses are the means of original values; Data transformed to square root transformation;
DAS: days after spray

after spray (DAS) was recorded in the hand weeding treatment while highest value was recorded in weedy check. Amongst the herbicide treatments, application of GOD H007 903 g/ha had significantly lower total weed count, though this treatment was statistically similar with application of this herbicide at 882 g/ha which was further alike with application of glyphosate 820 g/ha. However at all the later stages of 30, 45 and 60 DAS, application of GOD H007 903 g/ha, remaining statistically alike with glyphosate 820 g/ha, resulted in significantly lowest total weed count. These findings are in close conformity with the findings of Corbett *et al* (2004). Total weed dry weight also followed the similar tread as the total weed count with hand weeding treatment showing lowest value at 15 DAS while weedy check had the highest total weed dry weight (Table 2). Amongst the herbicide treatments GOD H007 903 g/ha had significantly lowest total weed dry weight at all stages of observation, though this treatment was statistically alike with GOD H007 882 g/ha at 15 DAS and with pyrithiobac sodium 625 g/ha at all other stages of 30, 45 and 60 DAS. This is because of the effective control of weeds with this new herbicide which reduced the species wise weed density as well as dry weight which ultimately resulted in significantly lowest total weed count and weed dry matter. Weed control efficiency followed the trend of total weed dry matter with highest value recorded with hand weeding treatment at 15 DAS (Table 3) while at all the later stages of observation application of GOD H007 903 g/ha showed higher efficiency for controlling weeds. Weed control efficiency was lower with the application of pyrithiobac sodium as this herbicide is not effective in controlling grassy weeds. Rest of the treatments were also superior to weedy check in terms of weed control efficiency.

The data on effect of different treatments on the fresh and dry herbage yield in pastureland at 60 DAS has been given in Table 4 which reveals that application of pyrithiobac sodium 62.5 g/ha resulted in significantly highest fresh and dry herbage yield of grass. Application of lower dose of this new herbicide (860 g/ha) also gave higher fresh and dry herbage yield as compared to its higher doses of 882 and 903 g/ha. Hand weeding treatment resulted in significantly lowest fresh and dry herbage yield as the entire plot was cleared of all vegetation before the start of the trial. Pyrithiobac sodium effectively controlled the broad leaved weeds

Table 2. Effect of weed control treatments on total weed dry weight (g/m^2) in pastureland

Treatment	Dose (g/ha)	Stages of Observation				
		Before spray	15DAS	30DAS	45DAS	60DAS
GOD H007 64.5% SG	860	12.64 (159.16)	8.79 (76.92)	7.73 (59.28)	9.22 (84.64)	11.79 (138.67)
GOD H007 64.5% SG	882	11.61 (134.60)	7.39 (54.16)	6.49 (41.68)	8.14 (65.73)	11.03 (121.16)
GOD H007 64.5% SG	903	12.07 (145.17)	6.15 (37.44)	5.92 (34.80)	6.97 (48.27)	9.63 (92.23)
Pyrithiobac sodium 10% EC	62.5	11.85 (140.12)	12.19 (148.17)	13.21 (174.17)	15.31 (233.89)	16.80 (282.23)
Glyphosate 41% SL	820	11.93 (142.09)	8.92 (79.27)	6.46 (41.49)	7.28 (52.56)	9.84 (96.32)
Hand weeding	-	13.49 (181.40)	3.73 (13.59)	7.08 (46.52)	10.83 (116.95)	14.17 (200.28)
Weedy check	-	11.59 (133.89)	13.50 (182.04)	14.49 (209.40)	16.68 (277.91)	18.96 (359.20)
SEm±		0.26	0.27	0.23	0.23	0.24
LSD (P=0.05)		0.80	0.82	0.70	0.70	0.73

Values in parentheses are the means of original values; Data transformed to square root transformation;
DAS: days after spray

Table 3. Effect of weed control treatments on weed control efficiency (%)

Treatment	Dose (g/ha)	Weed control efficiency			
		15DAS	30DAS	45DAS	60DAS
GOD H007 64.5% SG	860	57.75	71.69	69.54	61.04
GOD H007 64.5% SG	882	70.25	80.10	76.35	67.08
GOD H007 64.53% SG	903	79.43	83.38	82.63	75.55
Pyrithiobac sodium 10% EC	62.5	18.60	16.82	15.84	16.03
Glyphosate 41% SL	820	56.46	80.17	81.09	72.66
Hand weeding	-	92.54	77.78	57.92	40.80
Weedy check	-	0.00	0.00	0.00	0.00

Table 4. Effect of treatments on fresh and dry herbage yield (q/ha) of associated grasses in pastureland

Treatment	Dose (g/ha)	Herbage yield	
		Fresh	Dry
GOD H007 64.5% SG	860	175.56	52.53
GOD H007 64.5% SG	882	171.31	51.46
GOD H007 64.5% SG	903	169.20	50.31
Pyrithiobac sodium 10% EC	62.5	225.09	67.13
Glyphosate 41% SL	820	169.54	50.36
Hand weeding	-	116.15	35.99
Weedy check	-	147.65	44.44
SEm±		1.32	0.43
LSD (P=0.05)		4.07	1.32

and had little effect on grasses and hence its application resulted in higher yield while glyphosate had adverse effect on both grassy and broadleaved weeds and hence lower yield when either glyphosate or this new product having glyphosate was applied.

Conclusion

Application of GOD H007 @ 903 g/ha showed promise to be effective for managing weeds in pasture land.

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References

Angiras NN. 2014. Management of perennial weeds under noncrop land hill ecosystems. Indian Journal of Weed Science **46**(1):52-60.

Corbett J, Askew S, Thomas W and Wilcut J. (2004). Weed efficacy evaluations for bromoxynil, glufosinate, glyphosate, pyrithiobac and sulfosate. Weed Technology, **18**(2):443-453.

Mishra A and Tosh GC. 1979. Chemical weed control studies of dwarf wheat. Journal of Research (Orissa University of Agricultural Science and Technology) **10**: 1-6.

Rana SS, Badiyala D, Sharma N and Kumar R. 2015. Major weeds in the non-cropped lands of Himachal Pradesh. Department of Agronomy, CSK Himachal Pradesh Krishi Vishvavidyalya, Palampur.