Response of Herbicides on *Artemisia vulgaris*

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INTRODUCTION

Mug wort (*Artemisia vulgaris*) is a prominent weed shrub in forest grazing lands or pastures of Central Sheep and Wool Research Institute, Avikanagar and adjoining areas representing semi arid conditions in Rajasthan. Because of high seed production and their easier dessimination due to wind, the plant is seriously encroaching new lands. This has resulted in shorter growth and subsequently low fodder production. Though, young growth of the plant is browsed by sheep and goat during spring season, its existance can not be tolerated at the cost of native grasses of high forage value.

REVIEW OF LITERATURE

Control of various species of *Artemisia* has been reported by many researches. Pechanec *et al.* (1965) reported that burning killed most of *A tridanta* but exposed the soil to erosion. The use of herbicides was cheaper than mechanical methods. Moja (1954) suggested a cultural method of controlling mug wort (*A. vulgaris*) by sowing lucerne in plots infested with the weed shrub which strongly competed with it and reduced the size and population of the latter. Mueggler and Blaisdell (1958) informed, rato beating and burning gave 86% and 89% reduction in stand of *A. tridanta*, respectively.

The use of herbicides e. g. 2, 4-D for weed control in grasslands infested with *Artemisia* species, is advantageous to increase the fodder production of under story grasses. Favourable results have been reported by Hull *et al.* (1952) Hyder and Sneva (1956), Mueggler and Blaisdell (1958). Hederick *et al.* (1966) and Tabler (1966)

Hull *et al.* (1952), Hyder (1953), Blaisdell and Mueggler (1956), Robertson and cords (1956), Cornelius and Graham (1958), Hyder *et al.* (1958), Selleck (1964) Hederick *et al.* (1966) and Tabler (1966) have reported moderate to heavy damage even upto 98% in *A. tridantata*, *A. absinthium*, *A. tridarta*, *A. cana*, with the use of 2, 4-D and/or 2, 4, 5-T esters. Most of them recommended the doses of 1.0

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and 1.0 to 2.0 kg a.e. per/ha for application of 2, 4, 5-T and 2, 4-D esters. respectively.

MATERIALS AND METHODS

The experiment was conducted on the Institutes' farm. A range patch consisting dense popu ation of *A. vulgaris* was selected. The bush flora (plant population per hactare given in brackets) of the range consisted of *Artemisia vulgaris* (51,250), *Tephrosia purpurea* (3500), *Sericostoma pauciflorum* (1400), *Crotalaria burhia* (1250) and others including *sida* spp. and *Leptadenia spartium* (250). The ground cover consisted of monocots viz. *Cenchrus catharticus*, *Aristida* spp. and *Cyperus* spp. and dicots viz. *Indigofera cordifolia* and *Leucas aspera*.

The treatments of the experiment were as follows :—

S. No.	Trade Name	Herbicides* Chemical from	Doses kg a.e./a.i. per ha	Applications Frequencies
1.	Phytar—560	Dimethyl arsenic acid	2, 4 and 6	(I) Spraying at full doses on 23-8-68
2.	Bladex 'C'	2, 4-D ethyl ester	2, 3 and 4	(II) Spraying at full doses on 23-8-68 plus
3.	Spontox	2,4-D+2,4,5-T ester	1, 3 and 5	second spraying at half doses on
4.	Ansar-529	Mono sodium acid methanearsonate		27-9-63

*Manufacturers : S. No. 1 and 4—Ansul Co., U. S. A., S. No. 2—Burmah Shell (Nocil) and S. No. 3—May and Baker.

The spraying was done on plots of the size 2mx2m after diluting the required quantities of each herbicide in 1000 litres of water per hectare. Hand poly sprayers were used. The shrubs of *Artemisia* and others were fully grown up. The second spraying coincided with usual flowering time of A. *vulgaris*.

Observations—Effect of herbicides, doses and frequencies of application were noted by visual interpretations for both, bush species and the ground covers. Detail studies were however, concentrated upon the response of *Artemisia vulgaris*.

The following characteristics were taken into consideration.

(A) Plant growth in height (cm)—Average height of 5 random plants from collar to the tip measured at the end of the experiment.

(B) Visual estimate of damage—(1) Just before second spraying and (2) Two months after second spraying.

(C) Percentage regeneration—Plants harvested on 30-11-68 at the base, were counted for new sprouts after $1\frac{1}{2}$ month. The number of newly sprouted plants out of the total, have been presented in percentage.

(D) Seed yield per plant (mg)—seed collected per plot divided by plant population.

(E) Percentage seed germination—Germination of seeds tested in petri dishes in the laboratory.

RESULTS AND DISCUSSION

General effect of treatments visualised on different bush species and the ground cover :—

1. Phytar-560. *Artomisia vulgaris* The foliage and young twigs turned brown and then black but tips were normal green and erect. A month later, new shoots sprouted at collar and mid stem Another application damaged new shoots consequently resulted in low flowering and seed setting. *Tephrosia purpurea, sericostoma pau iflorum* were greatly and *crotalaria burhia* to some extent were damaged but temporarily. From ground cover *Indigofera cordifolia, Leucas aspera* and *Cenetrus catharticus* were killed.

2. Bladex 'C' *A. vulgaris*—slight bending in twigs which advanced with the time accompanied by chlorosis. No much response towards low seed setting and regeneration except with high rate and second application: *T. purpure i* and *S. pausiflorum* developed chlorosis and ultimately died within a month even with lowest dose. No seed setting. *C. burhia* was not affected *I. cordifolia* and *L. aspera* on the turf were damaged.

3. Spontox—Similar effect as with Bladex 'C' but of much higher intensity. *C. burhia* was slightly damaged.

4 Ansar 529—Among bushes none except *C. burhia* which responded slightly. On the ground, grass species viz. *C. catharticus* and *Aristida* spp. were killed and the legume *I. cord folia* was hurt.

The response of treatments on *Artemisia vulgaris* (For data refer Table No. 1)

(A) *Plant height* :— Application of herbicides arted to inhibit the growth in height of plants as visible from figures of treated and untreated plants. Height of plants was tremendously checked by 'Phytar' followed by 'spontox'. Their efficiency increased with the increase in dose and second spraying. Heighest dose of Bladex 'C' accompanied by second application greatly responded in inhibiting the height. Ansar was not effective.

(B) Visual estimate of damage :— The damage was estimated for the first as well as second spraying.

(1) Effect of first spraying :— Maximum demage was reported from plants treated with high doses of 'phytar' and 'spontox'. The arsenical herbicide 'phytar' had high potency to injure the plant tissues came incontact. But, the effect was not systemic hence, new sprouts appeared. 'Spontox' which is a harmone herbicides preparation of 2, 4-D+2, 4, 5 T, had systemic effect of permanent nature. Bladex 'C' containing 2, 4-D had weaker response than spontox since, the former lacked in 2, 4, 5-T which is highly effective against woody shrubs. 'Ansar' did negligible damage to *Artemisia vulgaris*.

(2) Effect of second application :— Damages to *Artemisia vulgaris* visualised after second application were quite distinct and of higher magnitudes than single application alone. From bush control point of view, the grades from A to C may be considered to be of practical value. Medium and high doses of 'spontox' and 'phytar' applied second time were appreciated.

(C) Percentage regeneration :— 'Phytar', the contact arsenical herbicide which severely inhibited growth and damaged plant organs, could not effect complete kill of *Artemisia* shrubs as 70 percent of plants regenerated. Ansar also a contact arsenical herbicide, was as good as those untreated i.e. 25% plants came up again.

The systemic harmone herbicides viz. 'Spontox' and 'Bladex' considerably reduced the regeneration particularly at high rates accompanied with second application.

(D) Seed yield per plant :— Seed yield was lowered by application of herbicides. 'Phytar' played a vital role in reducing the seed yield. Inhibitary effect and severe damage to plant organs caused by 'phytar' seem to have resulted in low seed production.

All except in one case herbicides and doses have responded to second spraying in reducing the seed yield. It would be proper to mention here that the second spraying coincided with normal flowering period of *A. vulgaris*. Medium and highest doses of 'phytar' and 'spontox' and highest dose of Bladex 'c' when applied for the second time, proved most successful in lowering seed setting.

(E) Percentage seed germination :— From the results it appear that there was some relation between seed yield of the plants and germination capacity of seeds. More the seed yield lower was the germination. The mean seed yield from a plant treated with phytar was lowest (96 mg) but the percentage seed germination was comparatively high (22%). The results were entirely different with Ansar which produced comparatively more seed of low germination.

SUMMARY

The experiment was laid out on a range patch on the farm of Central Sheep & Wool Research Institue, Avikanagar (Rajasthan), with an object to study the response of four herbicidal preparations (Phytar-560, Bladex 'c', spontox and Ansar-529) with three rates (low, medium and high) and two (single or double spraying) frequencies of application, on *Artemisia vulgaris*.

The following conclusions could be drawn :—

1. Growth in height, vigour and seed yield was greatly reduced with the application of 'phytar-560' and 'spontox'.

2. Regeneration of plants was much lowered by harmone herbicides viz. 'spontox' and 'Bladex-c'.

3. 'Ansar-529' was not suitable herbicide to control *A. vulgaris*, however, the treated plants had seeds of low germination capacity.

4. Medium and high doses responded satisfactorily.

5. Application for the second time (at half rate of the first) was beneficial rather than first single application.

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Table I :— Response of herbicides on *Artemisia vulgaris*

Herbicides	Doses and Frequencies	A Average Plant height (cm)	B Visual estimate of damage (1)	(2)	C Percent regeneration of Plants	D Seed yield Average per plant (mg)	E Percentage seed germination
1. Untreated	Nil	132	Nil	Nil	100	1046	17
2. Dimethyl	2 kg I	101	E	—	78	97	40
Arsinic acid	2 kg I+1 kg II	100	E	D	75	92	25
(Phytar-560)	4 kg I	98	E	—	66	149	34
	4 kg I+2 kg II	96	E	C	67	71	12
	6 kg I	90	C	—	69	128	13
	6 kg I+3 kg II	92	C	A	66	42	12
	Mean	96	—	—	70	96	22
3. 2, 4-D	2 kg I	112	F	—	65	268	12
Ethylester	2 kg I+1 kg II	115	F	E	58	263	27
(Bladex-C)	3 kg I	101	E	—	50	276	14
	3 kg I+1½ kg II	104	E	D	48	228	8
	4 kg I	108	E	—	49	269	10
	4 kg I+2 kg II	83	E	D	40	62	9
	Mean	104	—	—	51	227	13

Contd.

Herbicides	Doses and Frequencies	A Average Plant height (cm)	B Visual estimate of damage (1)	B (2)	C Percent regeneration of Plants	D Seed yield Average per plant (mg)	E Percentage seed germination
4. 2, 4-D+2, 4, 5-T	1 kg I	134	F	—	56	197	29
ester	1 kg I+½ kg II	107	E	E	53	208	13
(Spontox)	3 kg I	90	E	—	35	176	25
	3 kg I+1½ kg II	86	D	C	29	62	15
	5 kg I	95	D	—	38	154	22
	5 kg I+2½ kg II	93	C	A	23	59	13
	Mean	101	—	—	40	142	20
5. Monosodium	2 kg I	102	H	—	100	431	7
acid methane	2 kg I+1 kg II	110	H	G	94	324	3
arsonate	3 kg I	122	H	—	95	369	5
(Ansar-529)	3 kg I+1½ kg II	124	H	G	92	219	2
	4 kg I	118	H	—	96	395	10
	4 kg I+2 kg II	109	H	G	94	234	4
	Mean	114	—	—	95	329	5

*Visual estimate of damage :— Grades indicating percent damage.
A-70 to 80, B-60 to 70, C-50 to 60, D-40 to 50, E-30 to 40, F-20 to 30, G-10 to 20, H-0 to 10.