EVALUATION OF HERBICIDES FOR NEALLEY'S SPRANGLETOP (*LEPTOCHLOA NEALLEYI*) CONTROL

Eric A. Bergeron[1], Eric P. Webster[1], Benjamin M. McKnight[1], Samer Y. Rustom, Jr.[1]

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INTRODUCTION

Nealley's sprangletop (*Leptochloa nealleyi* Vasey) is a summer annual clump grass found predominately in marshes, mostly near the coast of Louisiana and Texas. It has an upright growth habit with a height of 1- to 1.5-m. Nealley's sprangletop has a 25- to 50-cm panicle and racemes 2- to 4-cm long. The seed is 1.5 mm long and has an estimated viability of 10 to 20% (Webster 2014). The ligule is membranous and the leaf sheath near the base of the plant has sparse pubescence. Nealley's sprangletop is fast growing following a short lag time after emergence, with an estimated growth of > 2.5 cm/day.

Nealley's sprangletop is commonly found along ditches and roadsides; however, Smith (1983) references Nealley's sprangletop infestations in southern rice production. Over the past 10 years this weed has expanded its habitat by becoming a troublesome weed in rice production in Louisiana and Texas (Saichuk, 2014). Nealley's sprangletop has also been reported in fields near the Louisiana and Arkansas border. This weed is considered to be a clump grass very similar to vaseygrass, and is often confused with this grass. Although this weed is classified as an annual it often survives the mild winters in south Louisiana and Texas. Nealley's sprangletop has a perennial growth habit under these environments, and this characteristic makes it more difficult to control. Amazon sprangletop [*Leptochloa panicoides* (J. Peresl) A.S. Hitchc] and bearded sprangletop [*Leptochloa fusca* (L.) Kuinth] became more problematic in rice with the development of quinclorac (Jordan 1997). It is believed that the widespread adoption of the Clearfield® rice technology in the mid-south further caused the proliferation of Amazon and bearded sprangletop, but it may also be the reason for the expansion of Nealley's sprangletop as a weed in rice.

MATERIALS AND METHODS

A study was established in a LSU AgCenter glasshouse on the LSU Baton Rouge Campus. The study was a completely randomized design with nine replications. This study was repeated. Nealley's sprangletop seed was broadcast planted in plastic planting flats with 50 - 2.5-cm by 2.5-cm cells filled with potting mix. At the one- to two-leaf stage, Nealley's sprangletop was transplanted into 6- by 10-cm cone containers, commonly referred to as cone-tainers, and placed into racks. The racks were placed in plastic containers filled with 67 L of water for subsurface irrigation. The water was held for the duration of the study to simulate flooded rice field conditions. Urea fertilizer, 46-0-0, was added to the water at 280 kg/ha.

Nealley's sprangletop was treated in the one- to two-tiller growth stage at 20- to 30-cm height. Herbicides applied were: propanil at 2240 g a.i. ha^{-1}, propanil at 4480 g a.i. ha^{-1}, propanil plus thiobencarb at 3360 g a.i. ha^{-1}, propanil plus thiobencarb at 6720 g a.i. ha^{-1}, quinclorac at 420 g a.i. ha^{-1}, thiobencarb at 4480 g a.i. ha^{-1}, bispyribac at 28 g a.i. ha^{-1}, imazethapyr at 105 g a.i. ha^{-1}, imazamox at 44 g a.i. ha^{-1}, penoxsulam at 40 g a.i. ha^{-1}, clethodim at 150 g a.i. ha^{-1}, cyhalofop at 314 g a.i. ha^{-1}, fenoxaprop at 122 g a.i. ha^{-1}, quizalofop at 185 g a.i. ha^{-1}, glufosinate at 820 g a.i. ha^{-1}, glyphosate at 1120 g a.i. ha^{-1}.

[1] Louisiana State University Agricultural Center, 104 Sturgis Hall, Baton Rouge, LA 70808. ebergeron@agcenter.lsu.edu.

Herbicides were applied with a CO2-backpack sprayer calibrated to deliver 140 L/ha. Prior to application the plants were removed from the glasshouse and placed outside for 2 hours prior to and after herbicide application to allow the plants to acclimate to the outside environment and allow the spray to thoroughly dry after application.

Nealley's sprangletop control, total leaf number, total tiller number, and overall height were evaluated at 0, 5, 10, and 14 days after treatment (DAT).

RESULTS AND DISCUSSION

At 5 DAT, control of Nealley's sprangletop did not exceed 70% (Table 1); however, by 10 DAT, Nealley's sprangletop treated with clethodim, quizalofop, and fenoxaprop was controlled 82 to 97%. Propanil containing herbicides controlled Nealley's sprangletop 31 to 56% at 5 DAT, and this control did not vary at 10 and 14 DAT. Imazethapyr and imazamox have little activity on this weed, and this may demonstrate why this weed has become a problem in rice production. Quinclorac and penoxsulam have no activity on Nealley's sprangletop, and these herbicides used in Nealley's sprangletop research trials to control other broadleaf and grass weeds. Nealley's sprangletop, when treated with fenoxaprop, control was 98% at 14 DAT. Fenoxaprop is the only herbicide labeled in rice that was evaluated in this trial that controlled Nealley's sprangletop over 90%.

Total number of leaves (Table 2), total number of tillers (Table 3), and overall plant height (Table 4) reflect control data observed in this trial (Table 1). Nealley's sprangletop treated with quinclorac, imazethapyr, and imazamox produced more tillers compared with the nontreated.

Imazethapyr and imazamox treated Nealley's sprangletop resembles conventional rice that has received a drift of these herbicides. The plants are stunted (Table 4) with excessive tiller production (Table 3).

Nealley's sprangletop often survives the winter in south Louisiana and Texas, and often needs a burndown application in the spring prior to planting. The use of glyphosate and glufosinate may not totally control this weed (Table 1), but these herbicides can be used in an overall weed control program to help manage this growing problem. Clethodim and quizalofop are also herbicides that may be used as a burndown application product in the spring, and this would be similar to what is being done to manage glyphosate resistant ryegrass in the mid-south.

Quizalofop is also a promising product in the future. With the development of Provisia® rice, a non-GMO rice resistant to quizalofop, this may become an option for producers in the future**.**

Table 1. Control of Nealley's sprangletop, averaged over two glasshouse runs.

Herbicide	Rate	5 DAT	10 DAT	14 DAT
	g ha^{-1}	%		
Nontreated		0	0	0
Propanil	2240	41	45	38
Propanil	4480	56	65	60
Propanil + thiobencarb	3360	31	32	26
Propanil + thiobencarb	6720	52	60	50
Quinclorac	420	0	0	0
Thiobencarb	4480	31	23	16
Bispyribac	28	11	15	9
Imazethapyr	105	11	24	22
Imazamox	44	9	26	29
Penoxulam	40	0	0	0
Clethodim	140	26	82	91
Cyhalofop	314	10	27	32
Fenoxaprop	122	33	96	98
Quizalofop	185	29	97	98
Glufosinate	820	69	85	87
glyphosate	1120	24	57	88
LSD		6		

Table 2. Total leaf number of Nealley's sprangletop, averaged over two glasshouse runs

Herbicide	Rate	0 DAT	5 DAT	10 DAT	14 DAT
	g ha^{-1}	#			
Nontreated		12	18	28	3
Propanil	2240	15	16	7	9
Propanil	4480	16	16	5	6
Propanil + thiobencarb	3360	13	14	10	17
Propanil + thiobencarb	6720	13	13	5	7
Quinclorac	420	18	26	40	4
Thiobencarb	4480	17	22	30	3
Bispyribac	28	9	14	23	3
Imazethapyr	105	14	16	31	3
Imazamox	44	14	17	30	3
Penoxulam	40	15	21	34	3
Clethodim	140	16	16	3	1
Cyhalofop	314	17	17	12	1
Fenoxaprop	122	16	16	0	0
Quizalofop	185	15	15	0	0
Glufosinate	820	12	12	2	1
Glyphosate	1120	16	17	7	1
LSD		4			

Table 3. Total tiller number of Nealley's sprangletop, averaged over two glasshouse runs.

Herbicide	Rate	0 DAT	5 DAT	10 DAT	14 DAT
	g ha^{-1}	#			
Nontreated		3	4	9	10
Propanil	2240	3	3	2	3
Propanil	4480	3	3	2	2
Propanil + thiobencarb	3360	2	3	5	6
Propanil + thiobencarb	6720	2	2	2	2
Quinclorac	420	4	6	14	15
Thiobencarb	4480	3	5	12	12
Bispyribac	28	2	3	8	8
Imazethapyr	105	3	3	13	14
Imazamox	44	3	4	13	15
Penoxulam	40	3	4	11	11
Clethodim	140	3	4	1	1
Cyhalofop	314	4	5	4	4
Fenoxaprop	122	3	4	0	0
Quizalofop	185	3	4	0	0
Glufosinate	820	3	3	1	1
Glyphosate	1120	3	4	3	1
LSD		4			

Table 4. Total plant height of Nealley's sprangletop, averaged over two glasshouse runs.

Herbicide	Rate	0 DAT	5 DAT	10 DAT	14 DAT
	g ha^{-1}	cm			
Nontreated		34	39	47	52
Propanil	2240	36	36	30	34
Propanil	4480	36	37	28	31
Propanil + thiobencarb	3360	31	32	32	36
Propanil + thiobencarb	6720	32	32	26	29
Quinclorac	420	37	43	51	55
Thiobencarb	4480	34	42	48	53
Bispyribac	28	30	34	38	41
Imazethapyr	105	32	35	33	38
Imazamox	44	33	36	36	37
Penoxulam	40	33	40	48	53
Clethodim	140	33	36	18	8
Cyhalofop	314	34	36	36	35
Fenoxaprop	122	34	36	4	0
Quizalofop	185	33	35	4	0
Glufosinate	820	35	35	16	15
Glyphosate	1120	36	38	25	13
LSD		4			

CONCLUSION

In conclusion, this research indicates that imazethapyr and imazamox, at best, suppresses Nealley's sprangletop. These products are labeled for use in Clearfield rice, resistant to the imidazolinone herbicides, and over 50% of the rice acreage in the mid-south is planted in Clearfield lines or hybrids. This may further explain the reason behind this weed expansion in the rice producing areas of the mid-south.

Nealley's sprangletop is a high seed producer with high seed viability at maturity. It is important to correctly identify this weed in order to select the appropriate weed management program (Webster 2014). Fenoxaprop is the best option for controlling Nealley's sprangletop in season. Rice producers should employ an overall weed management strategy; including, tillage, burndown applications, residuals, and in crop herbicide application, when trying to manage this weed. Care should also be taken to clean equipment before leaving an infested field.

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