

Safety of Mesotrione 4SC when Applied as a Spray at Planting and at First Mowing of a 3-way Mixture of Cool-Season Turfgrasses

Final Report

(Protocol #: HMS806A4-2007US)

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Jan. 22, 2008

A field study was conducted at the Washington State University Turfgrass and Agronomy Research Center (TARC), in Pullman, WA, during the summer of 2007 to evaluate the safety of mesotrione 4SC applied as a spray at planting and at first mowing of a 3-way mixture of cool-season turfgrasses. The 3-way mixture of cool-season turfgrasses were: 'NuDestiny' Kentucky bluegrass, 'Treasure' chewings fescue, and 'Gallery' perennial ryegrass in a 2:1:1 ratio by weight, respectively. By seed number the mixture was comprised of 80% Kentucky bluegrass, 13% chewings fescue, and 7% perennial ryegrass. The research site was planted on 30 May 07 at a seeding rate of 4 lbs/M. After planting and the spray application of mesotrione, the research area was irrigated with several short cycles per day until the grass seed had germinated. After establishment the research site was irrigated to prevent stress. The spray applications at planting (30 May 07) and at first mowing (3 Jul 07) were made with a bicycle-wheeled CO₂ pressurized sprayer with 11002 flat fan spray tips at 25 GPA. The research site was mowed 2 times per week following the initial mowing with a Toro 22" rotary rear bag push mower at a mowing height of 1.5". Beginning at 2 weeks after planting (WAP) and up to 8 WAP (25 Jul 07), percent stand establishment and percent weed control were recorded. Weeds in the study area were naturally occurring. The following weeds were present in the study area: pigweed *Amaranthus spp.*, common lambsquarter *Chenopodium album*, prickly lettuce *Lactuca serriola*, pineappleweed *Matricaria matricarioides*, Canada thistle *Cirsium arvense*, mayweed chamomile *Anthemis cotula*, dandelion *Taraxacum officinale*, shepardspurse *Capsella bursa-pastoris*, witchgrass *Panicum capillare*, and barnyardgrass *Echinochloa crus-galli*. There were no weeds present at the time of planting. Phytotoxicity (turfgrass injury) was rated using a scale of 0-10, with 10 = dead turf and levels above 2 as unacceptable. Turfgrass quality was rated using a rating scale of 1-9, with 9 equal to excellent turfgrass quality and levels below 6 as unacceptable. A randomized-complete block design was used with four replications and individual treatment plots were 9' x 10'.

Stand establishment, at any rating date, was not affected by any of the mesotrione 4SC or Siduron treatments compared to the check throughout the 8 weeks of the study (Table 1 and Figure 1).

While the seed was germinating, 2 WAP, the mesotrione 4SC at 280 g ai/ha treatment resulted in low but significant amounts of turfgrass injury (Table 2 and Figure 2). However, no injury was noticed after that. Unacceptable levels of turf injury occurred 1 week following the split application (6 WAP) at 175 and 210 g ai/ha. This turfgrass injury was very short-lived, with very little or no injury by 8 WAP.

Two WAP, turfgrass quality of the Siduron treatment was significantly less than the check (Table 3 and Figure 3). This was primarily due to the weeds present. On the other hand, there was no significant difference between any of the mesotrione treatments compared to the check. In addition, there were no significant differences among any of the treatments at 3 or 4 WAP. However, at 6 WAP, single applications of mesotrione 4SC at planting had higher turf quality compared to the check and each split application treatment. These high turfgrass quality ratings may, in part, be due to an apparent decrease in chewings fescue in the stand. Since 'Treasure' chewings fescue has a lighter green genetic color than 'NuDestiny' Kentucky bluegrass and 'Gallery' perennial ryegrass, lower levels of chewings fescue in the stand may make the overall stand look darker green. Each split application treatment, although not significantly different than the check, had the lowest turfgrass quality 6 WAP. By 8 WAP the mesotrione 4SC 175 g ai/ha treatment numerically had the highest turfgrass quality and was significantly higher than the split application treatments and the check.

All mesotrione treatments had high levels of weed control (Table 4 and Figure 4). Mesotrione did an excellent job controlling broadleaf weeds and also controlled annual grass weeds to a large extent except witchgrass (*Panicum* spp.) Siduron, on the other hand, gave very poor weed control. It did a good job controlling the annual grass weeds but not broadleaf weeds.

In summary, a single application of mesotrione 4SC, either at the 175 or 210 g ai/ha rate, on a Kentucky bluegrass, chewings fescue, and perennial ryegrass mixed stand (2:1:1) at planting resulted in the best overall treatments. Split applications were not necessary for additional weed control.

Table 1. The effect of mesotrione 4SC applied at planting and after first mowing on establishment of a 3-way mix of cool-season grasses.

Treatment	Rate (g ai/ha)	NIS (% V/V)	App. date	Stand establishment (%)*					
				6/6/07 1 WAP	6/13/07 2 WAP	6/20/07 3 WAP	6/27/07 4 WAP	7/11/07 6 WAP	7/25/07 8 WAP
Mesotrione + NIS	175	0.25	1	0	9.3	20.0	42.5	72.5	82.5
Mesotrione + NIS	210	0.25	1	0	9.8	25.0	51.3	77.5	86.3
Mesotrione + NIS	280	0.25	1	0	9.3	21.3	46.3	73.8	82.5
Siduron	6700	0	1	0	7.3	18.8	41.3	71.3	81.3
Mesotrione + NIS	175 + 175	0.25	1 & 2	0	9.3	25.0	52.5	77.5	85.0
Mesotrione + NIS	210 + 210	0.25	1 & 2	0	7.3	18.8	37.5	66.3	78.8
CHECK	0	0		0	7.3	22.5	47.5	73.8	82.5

*Stand establishment (0-100%).

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**Values within a column followed by the same letter are not significantly different LSD $P = 0.05$.

Table 2. The effect of mesotrione 4SC applied at planting and after first mowing on turfgrass injury of a 3-way mix of cool-season grasses.

Treatment	Rate (g ai/ha)	NIS (% V/V)	App. date	Turfgrass injury*					
				6/6/07 1 WAP	6/13/07 2 WAP	6/20/07 3 WAP	6/27/07 4 WAP	7/11/07 6 WAP	7/25/07 8 WAP
Mesotrione + NIS	175	0.25	1	0	0.0 b	0.0	0.0	0.0 c	0.0 b
Mesotrione + NIS	210	0.25	1	0	0.3 b	0.0	0.0	0.0 c	0.0 b
Mesotrione + NIS	280	0.25	1	0	1.3 a	0.0	0.0	0.0 c	0.0 b
Siduron	6700	0	1	0	0.0 b	0.0	0.0	0.0 c	0.0 b
Mesotrione + NIS	175 + 175	0.25	1 & 2	0	0.0 b	0.0	0.0	2.3 b	0.0 b
Mesotrione + NIS	210 + 210	0.25	1 & 2	0	0.0 b	0.0	0.0	2.8 a	0.8 a
CHECK	0	0		0	0.0 b	0.0	0.0	0.0 c	0.0 b

ns

ns

ns

*Turfgrass injury (phytotoxicity) was rated 0-10, with 10 = dead turf.

**Values within a column followed by the same letter are not significantly different LSD $P = 0.05$.

Figure 1. The effect of mesotrione 4SC applied at planting and after first mowing on establishment of a 3-way mix of cool-season turfgrasses.

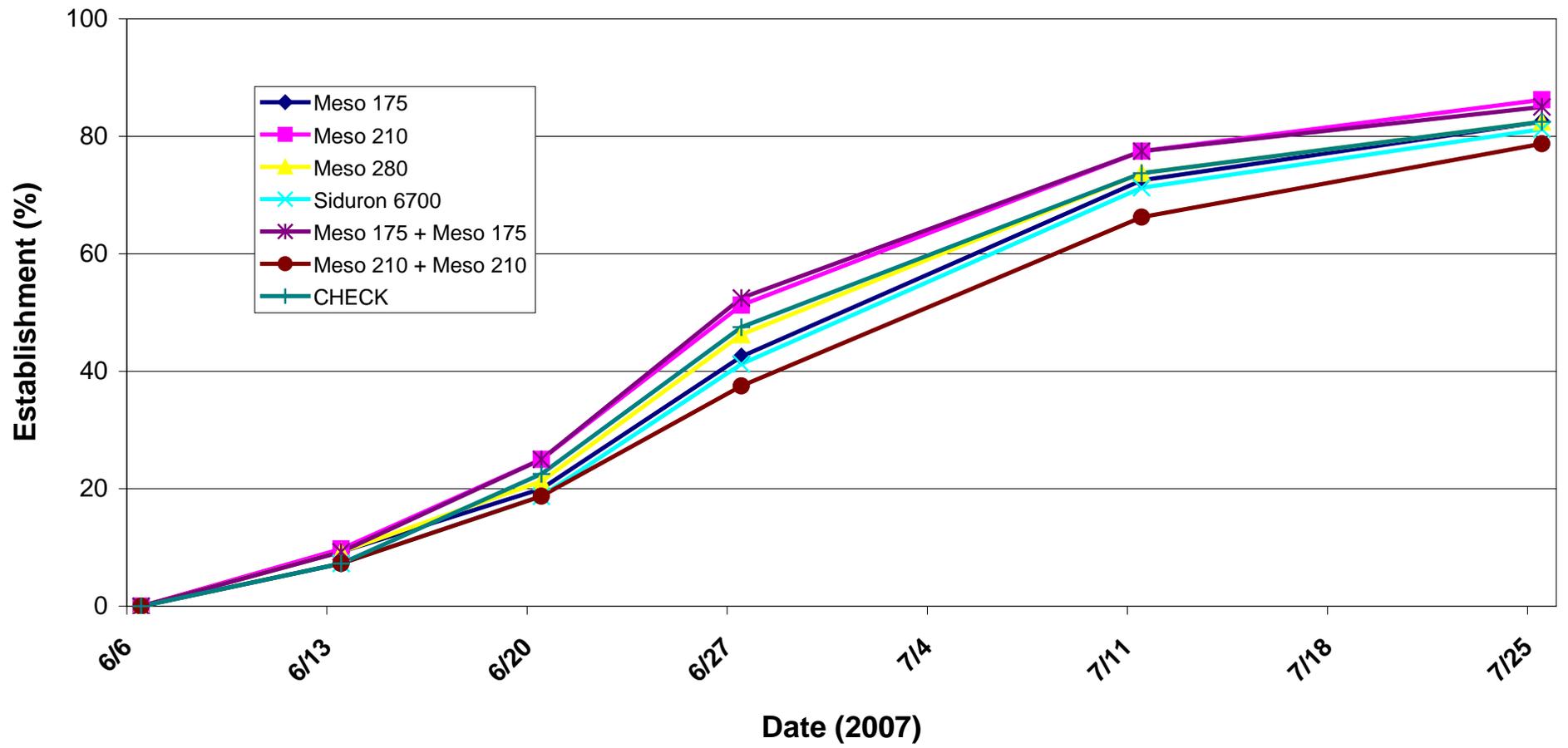


Figure 2. The effect of mesotrione 4SC applied at planting and after first mowing on turfgrass injury of a 3-way mix of cool-season turfgrasses.

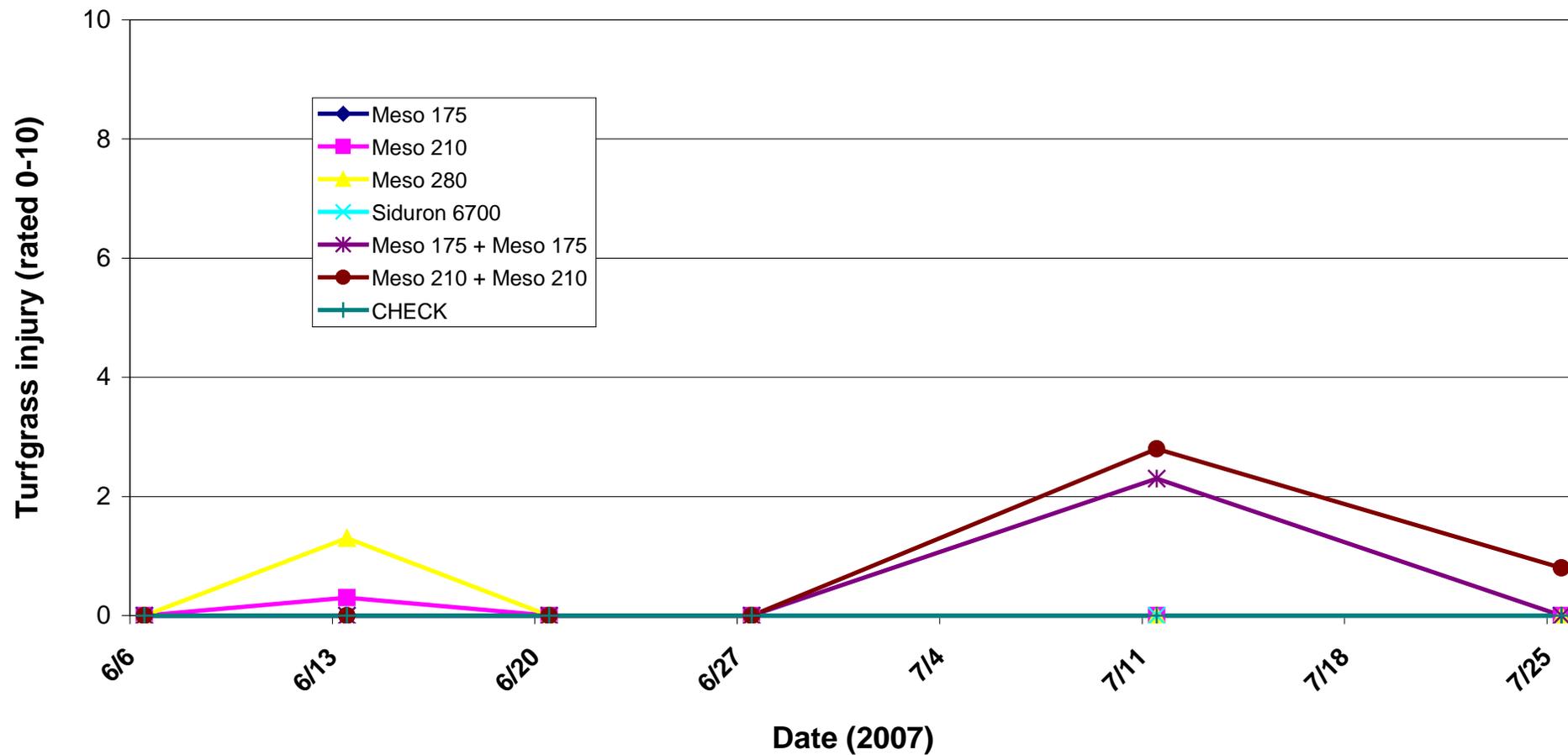


Table 3. The effect of mesotrione 4SC applied at planting and after first mowing on turfgrass quality of a 3-way mix of cool-season grasses.

Treatment	Rate (g ai/ha)	NIS (% V/V)	App. date	Turfgrass quality*					
				6/6/07 1 WAP	6/13/07 2 WAP	6/20/07 3 WAP	6/27/07 4 WAP	7/11/07 6 WAP	7/25/07 8 WAP
Mesotrione + NIS	175	0.25	1	0	6.3 ab	6.0	5.5	6.8 a	6.8 a
Mesotrione + NIS	210	0.25	1	0	6.0 bc	6.0	5.5	6.5 a	6.5 ab
Mesotrione + NIS	280	0.25	1	0	6.0 bc	6.0	5.8	6.5 a	6.5 ab
Siduron	6700	0	1	0	5.8 c	6.0	5.8	6.0 ab	6.3 ab
Mesotrione + NIS	175 + 175	0.25	1 & 2	0	6.3 ab	6.0	6.3	4.8 c	6.0 b
Mesotrione + NIS	210 + 210	0.25	1 & 2	0	6.3 ab	6.0	5.5	4.5 c	6.0 b
CHECK	0	0		0	6.5 a	6.0	5.8	5.3 bc	6.0 b

*Turfgrass quality rated 1-9, with 9 = excellent.

ns ns ns

**Values within a column followed by the same letter are not significantly different LSD $P = 0.05$.

Table 4. The effect of mesotrione 4SC applied at planting and after first mowing on weed control of a 3-way mix of cool-season grasses.

Treatment	Rate (g ai/ha)	NIS (% V/V)	App. date	Weed control (%)*					
				6/6/07 1 WAP	6/13/07 2 WAP	6/20/07 3 WAP	6/27/07 4 WAP	7/11/07 6 WAP	7/25/07 8 WAP
Mesotrione + NIS	175	0.25	1	0	91.3 a	92.5 a	95.0 a	96.3 a	97.5 a
Mesotrione + NIS	210	0.25	1	0	85.0 a	95.0 a	93.8 a	96.8 a	96.8 a
Mesotrione + NIS	280	0.25	1	0	87.5 a	95.0 a	95.0 a	98.8 a	98.8 a
Siduron	6700	0	1	0	52.5 b	28.8 b	12.5 b	15.0 b	16.3 b
Mesotrione + NIS	175 + 175	0.25	1 & 2	0	90.0 a	95.0 a	93.8 a	98.8 a	98.8 a
Mesotrione + NIS	210 + 210	0.25	1 & 2	0	91.3 a	95.0 a	95.0 a	100.0 a	100.0 a
CHECK	0	0		0	0.0 c				

*Weed control (0-100%).

ns

**Values within a column followed by the same letter are not significantly different LSD $P = 0.05$.

Figure 3. The effect of mesotrione 45C applied at planting and after first mowing on turfgrass quality of a 3-way mix of cool-season turfgrasses.

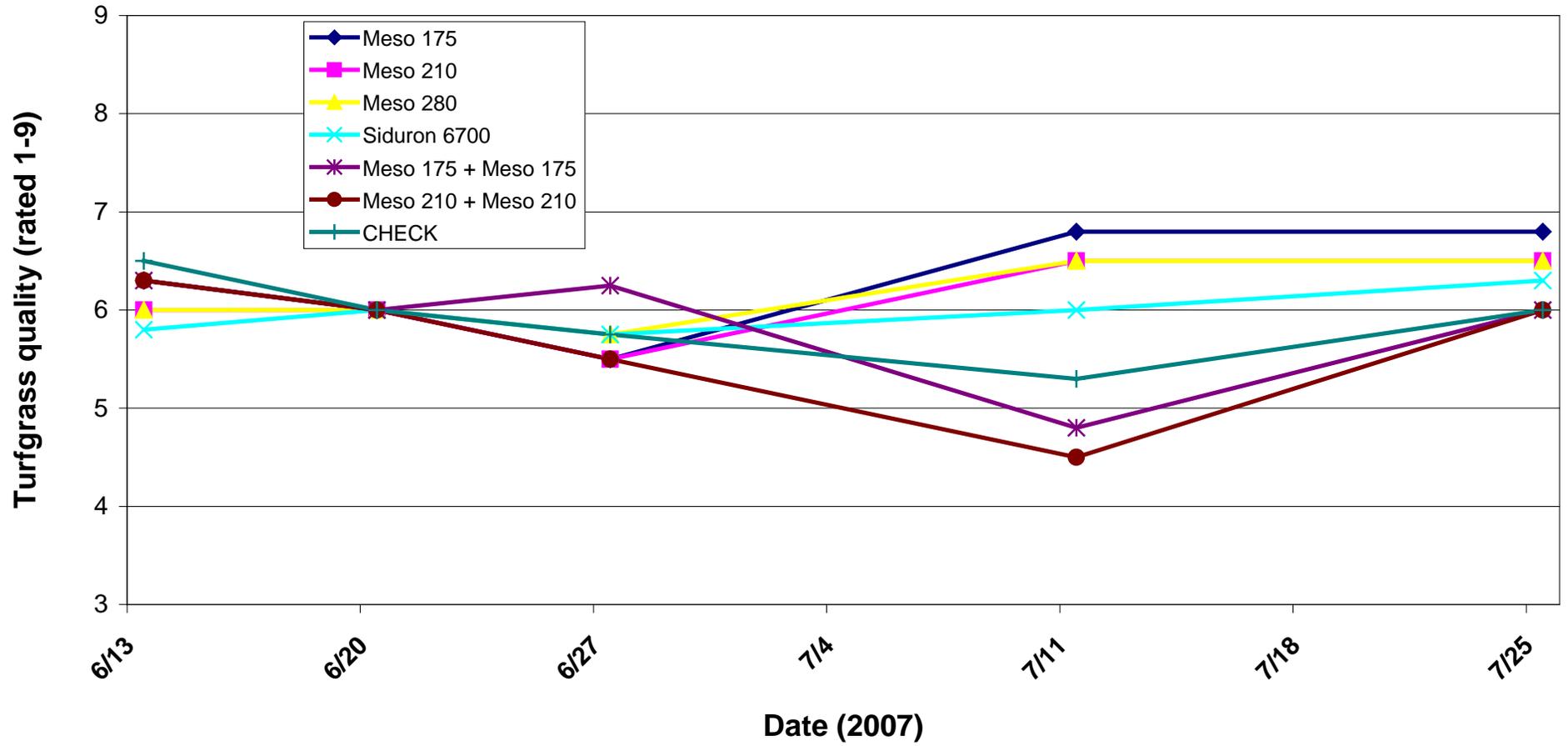


Figure 4. The effect of mesotrione 4SC applied at planting and after first mowing on weed control of a 3-way mix of cool-season turfgrasses.

