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Qualitative characteristics of sugar beet as affected by different broadleaf herbicides combinations

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ABSTRACT-Several herbicides are registered for selective weed control in sugar beet; however, no single chemical herbicide can control all weeds in beet fields. Frequently, two or more herbicides may have to be combined sequentially or as tank mixed to achieve adequate broad-spectrum weed control. In order to evaluate the effects of some combinations of broadleaf herbicides on sugar beet yield and quality, a field experiment was conducted in randomized complete block design with three replications at Miandoaab Agricultural Research Station during 2009-2010 growing season. The results showed that weed competition decreased root yield up to 84%. The maximum root yield (73.66 tha^{-1}) was obtained from 4.5 $kgha^{-1}$metamitron application at 2-to 4-leaf stage and the minimum root yield was obtained in the control (20.66tha^{-1}). The herbicide treatments had a significant effect on white sugar content so that the highest white sugar yield was achieved from bettanal Progress Am herbicide (10.9 tha^{-1}) and the lowest white sugar yield was found in control treatment (1.49 tha^{-1}). The lowest sodium, potassium, amino-nitrogen as well as molasses content were obtained from phenmedipham + desmedipham + ethofumesate and the highest value for the above parameters was observed in control treatment. Generally, weed competition led to decreasing root yield and sugar content and treatment bettanal Progress Am herbicide was recommended to control broadleaf weeds.

INTRODUCTION

Weeds are known to cause crop yield losses, hamper harvest, reduce quality of the harvest product, and perhaps harbor insects and diseases that may harm the crop. Yield losses are of the greatest concern and have been predicted using early season assessments of the weed population such as weed seedling density, relative time of emergence, weed pressure, and relative leaf area (Schweizer and May, 1993; Dieleman and Mortensen, 1998). Sugar beet is a poor competitor with weed in arable fields because it is slow growing early in the season and has a low canopy in its first year of a biennial life cycle. Sugar beet is not competitor with emerging weeds until it has at least 8 true leaves (May, 2001). Weeds that emerge 8 weeks after sowing, and particularly after the sugar beet plants have eight or more leaves, are less likely to affect yield (Scott et al., 1979).

Approximately 70% of weed species in sugar beet fields are mainly broadleaf annual such as redroot pigweed (*Amaranthus retroflexus*) (Weaver and Williams, 1980; Schweizer and May, 1993; Heidari et al., 2007). Weeds such as redroot pigweed and fat-hen (*Chenopodium album*) can be taller than the crop canopy. Weed control is an essential component of productive agriculture. Herbicides are the primary tools to manage the weeds. The range of weed species controlled by each herbicide is also limited; so, mixtures of herbicides are employed to suppress weeds different species (Lajos and Lajos, 2000). There are also registered doses to ensure adequate control over a wide spectrum of weed species, weed densities, growth stages, and environmental conditions. Maximum weed control is not always necessary for optimal crop yields and combining reduced doses of herbicides with other management practices, such as tillage or competitive crops, can markedly increase the odds of successful weed control (Blackshaw et al., 2006).

Competition between sugar beet and annual weeds could be responsible for sugar yield reductions of 25-100% (Poorazar and Ghadiri, 2001). Applying two or more herbicides sequentially or as a tank mixture to crop production system is a common practice aimed to improve the spectrum of weed control, reduce production cost and/or prevent the development of weeds that are resistant to certain herbicides. Apparently, this approach is based on the assumption that herbicides would act independently when applied simultaneously or sequentially. However, it has been demonstrated that herbicides may interact before or after penetrating the plant and the outcome of the interaction can be synergistic, antagonist, or additive depending on whether the combined effect on the plants is greater, less than, or equal to the summed effect of the herbicides applied alone (Hatzios and Penner, 1985; Green, 1989; Zhang et al., 1995). Whenever herbicide combinations are used, potential for interaction exists. Weeds in sugar beet can germinate over a long period; sequential applications at intervals of 8 to 14 days between two sprays are needed (Petersen, 2004). For high efficacy of chemical method, the timing of application is very important. Weeds should be at cotyledon stage to ensure successful weed control (Dale and Renner, 2005; Dale et al., 2005).

The most popular active ingredients are phenmedipham, metamitron, ethofumesate, desmedipham, triflusulfuron-methyl, lenacil, clopyralid and chloredazone (May, 2001; Wilson et al., 2005; Deveikyte and Seibutis, 2006). Triflusulfuron-methyl is selective low use rate sulfonylurea herbicide for the control of annul and perennial broad-leaved weeds and grasses in sugar beets. Action of triflusulfuron-methyl is acetolactate syntheses (ALS), an enzyme in branched-chain amino acid biosynthesis (Wittenbach et al., 1994). Chloredazone is used extensively for broad-leaved weed control in sugar beet. Field observations indicate that weed emergence is recommenced 30 days after the application of a reduced dose of 1.3 kg/ha Chloredazone (Majidi et al., 2011).

The use of herbicides may reduce yield losses, as herbicides can reduce the weed infestation (Mehmeti, 2004). Majidi et al. (2011) showed that using a combination of broad-leaved herbicides caused weeds to be controlled and root yield to be increased. Deveikyte and Seibutis (2006) reported that the application of post-emergence herbicides led to higher sugar beet root and sugar yields. On the other hand, previous works have shown a differential response of sugar content of sugar beet to herbicides. Dale et al. (2005) found that white sucrose produced per unit area did not differ among post herbicide treatments and sugar and non-sugar contents were not affected by the herbicide treatments. Indeed, sugar yield data followed the root yield data because the herbicide did not have any influence on the amount of sugar beet root quality parameters (Dale et al., 2006).

There is little data on the effectiveness of mixture of different broad-leaved herbicides and their interaction on sugar beet production and quality in Iran. So, the aim of this study was to consider the effect of broad-leaved herbicides at different combinations on sugar beet yield and quality, in the western area of Iran.

Materials and Methods

The field experiment was conducted at Miandoaab Agricultural Research Station, West Azarbaijan Agricultural and Natural Resources Research and Education Center with longitude 46^o 90E and latitude 36^o 58N during 2009-2010 growing season. Soil type was silty-clay (Table 1).

Sowing date was 8 April 2010. The seeds of sugar beet (Rasool cultivar) were sown in rows (10 m length) which were 30 cm appart. To facilitate germination of sugar beet seeds, irrigation (far row system) was applied twice in the first 15 days after sowing. The experimental design was a randomized complete block with three replications. Experimental treatments included: chloredazone, phenmedipham, desmedipham, clopyralid, PDE (Phenmedipham+ Desmedipham+ Ethofumesate), trisulfuron-methyl and metamitron (Table 2). In control treatment, there was no herbicide use.

Weeds density was determined by weed counting at two stages: two weeks after spraying and one month later. A 0.50 m^2 quad rat was used for weed sampling. Weed species (*Chenopodium album, Amaranthus retroflexus, Portulaca oleracea, Echinochloa crus-galli, Setaria viridis and Sorghum halepense)* in every quad rat were identified, counted, uprooted, weighed (fresh), oven dried (at 70 °C for 48 hours), weighed and recorded. The plots were harvested in 25th of November, 2010. After measuring the sugar beet root yield, a 30-kg sample from each plot was obtained randomly for washing and pulping. About 150 g of pulp from each plot was prepared by Venema apparatus and kept in a freezer until analysis. Frozen sugar beet pulp samples were analyzed in sugar technology laboratory at Sugar Beet Seed Preparing and Breeding Center in Karaj (Iran) for purity parameters with Betalyser. Betalyser is a computer controlled system for automated routine analysis of beet sugar content as well as impurities: sodium, potassium and amino-nitrogen (milliequivalents (MEq) per 100 g of root). Sugar content (SC) was measured by polarimetry, Na and K by flame-emission photometry and amino-N by double beam filter photometry using the blue number method 22. The combined effect of Na, K and amino-N on the amount of sugar lost to molasses in the factory process was determined by the Reinefeld et al. (1974).

White sugar content was calculated using the following equation (Reinefeld et al., 1974):

WSC (%) = SC (%) – [0.343 (Na+K) + 0.094 amino N + 0.29].

An alkalinity coefficient (AC) was determined from the major non-sugars K, Na and amino-N, as follows (Reinefeld et al., 1974):

AC = (K + Na)/amino-N.

Table 1. Soil characteristics

Soil texture	Depth cm	EC dS/m	pH	N %	P ppm	K ppm	Zn ppm	Fe ppm	Cu ppm
silty-clay	0-30	0.62	7.2	0.23	5.34	80.94	5.50	12.10	2.1

Table 2.Treatments, doses and time of application of herbicides

Compound herbicide	Dose	Time of application (Sugar beet growth stage)
Metamitron	4.5 kg/ha	Pre emergence stage
Metamitron + Desmedipham	4.5 kg/ha+5lit/ha	Two-leaf stage
Metamitron + Desmedipham	2.25 kg/ha+2.5lit/ha	Two, four leaf stage
PDE	4 lit/ha	Two-leaf stage
Phenmedipham + Metamitron	6 lit/ha+4.5kg/ha	Two-leaf stage
Phenmedipham + Metamitron	3 lit/ha+2kg/ha	Two- four- leaf stage
Desmedipham + Trisulfuron-methyl	2 lit/ha+30g/ha	Cotyledon-stage
Desmedipham + Trisulfuron-methyl	1 lit/ha+15g/ha	Cotyledon-stage
PDE + Phenmedipham	4 lit/ha+6lit/ha	Two-leaf stage
PDE + Phenmedipham	2 lit/ha+3lit/ha	Two-leaf stage
PDE + Trisulfuron-methyl	4 lit/ha+30g/ha	Two-leaf stage
PDE + Trisulfuron-methyl	2 lit/ha+15g/ha	Two-leaf stage
Chloredazone + Phenmedipham	5 kg/ha+6lit/ha	Four- leaf stage
Chloredazone + Phenmedipham	3 kg/ha+3lit/ha	Two- four leaf stage
Chloredazone + PDE	5 kg/ha+4lit/ha	Two-leaf stage
Chloredazone + PDE	3 kg/ha+2lit/ha	Two- four leaf stage
Clopyralid + PDE	0.5 lit/ha+4lit/ha	Two-leaf stage
Clopyralid + PDE	250 ml/ha+2lit/ha	Two- four leaf stage
Control (no spray)	-	-

Gross sugar yield and white sugar yield were obtained by multiplying sugar content (SC) and white sugar content (WSC) by root yield.

The collected data were subjected to the analysis of variance (ANOVA) and mean comparisons were carried out using Duncan's multiple range tests by SAS 9.1 software.

RESULTS AND DISCUSSION

Root Yield

Sugar beet roots yield was significantly affected by the combination of herbicides (Table 3). Weeds (*Chenopodium album, Amaranthus retreflexus, Portulaca oleracea*. etc.) competition decreased root yield up to 84%. In other studies, it has been reported that weed interference in spring sugar beet decreased root yield from 71% to 80% (RashedMohassel et al., 2001). The maximum root yield was obtained from 4.5 kg metamitron application per hectare after cultivation (2, 4-leaf stage) and minimum root yield was achieved from the combination of 5 kg chloredazone and 2 litter desmedipham. Mean comparison showed that the application of 2 litter desmedipham, 30 gtrisulfuron-methyl and 200 ml Moy an at cotyledon-stage and its repetition after one week, and 4 l of PDE per hectare at 2-leaf stage and 0.5 litter clopyralid and 5 litter chloredazone at 2-leaf stage showed higher root yield.

Weeds are often controlled by tank-mixed herbicides compared to a single herbicide (Ashrafi et al., 2009; Majidi et al., 2011).There are a few reasons for the potential successful use of reduced doses, including: i) registered doses are set to ensure adequate control over a wide spectrum of weed species, weed densities, growth stages, and environmental conditions, ii) maximum weed control is not always necessary for optimum crop yields and iii) combining reduced doses of herbicides with other management practices(such as competitive crops) can markedly increase the odds of successful weed control (Blacks haw et al., 2006).

White Sugar Percentage

White sugar percentage is the most important trait of sugar beet quality. Herbicide treatments had statistically significant effects on white sugar content (Table3). Results showed that the treatment of bettanal Progress Am (PDE), desmedipham+ trisulfuron-methyl and PDE + phenmedipham led to the highest while control treatment (without herbicide) resulted in the lowest percentage of white sugar (Table 3). Deveikyte and Seibutis (2008) also reported that phenmedipham + desmedipham controlled a number of broadleaf weeds in sugar beet by inhibiting photo system II. Abdollahi and Ghadiri (2004) showed that the minimum sucrose

Table 3. Mean Comparison of sugar beet yield and quality affected by broadleaf herbicides

Treatments	Root yield (t/h)	White sugar yield (t/h)	White sugar (%)	Sodium MEq/100gr of root	Amino-Nitrogen MEq/100gr of root	Potassium MEq/100gr of root	Molasses %
Metamitron	73.66 a	9.5 b	12.9 d-h	2.71 h-l	1.73 f-i	6.18 de	2.89 h-j
Metamitron+ Desmedipham	43.01 f	6.51 e-h	14.1 a-e	3.03 f-j	2.11 c-h	6.69 b-e	3.21e-i
Metamitron+ Desmedipham	43.66 f	6.56 efg	15.2 ab	2.71 h-l	2.16 c-h	6.65 b-e	3.10 g-i
PDE	70.73 ab	10.9a	15.5 a	1.21 m	1.31 i	3.88 g	1.55 l
Phenmedipham+ Metamitron	58.85 cde	7.58 de	13.6 a-g	3.1 f-i	2.61 cd	6.71 b-e	3.29 e-g
Phenmedipham+ Metamitron	40.10 fg	5.64 f-i	13.7 a-f	3.68 e-g	2.45 c-f	6.03 de	3.25 e-h
Desmedipham+ Trisulfuron-methyl	60.33 cd	8.01 c-e	13.2 c-h	2.2 kl	1.54 hi	4.89 f	2.26 k
Desmedipham+ Trisulfuron-methyl	60.96 c	9.32 bc	15.4 a	1.98 l	2.47 c-e	6.58 b-e	2.35 k
PDE + Phenmedipham	36.47 gh	5.05 h-k	15.5 a	3.28 f-h	1.58 hi	6.3 de	3.11 g-i
PDE + Phenmedipham	39.40 fg	4.46 i-k	11.4 h	5.51 b	3.54 b	6.66 b-e	4.19 b
PDE + Trisulfuron-methyl	33.15 hi	3.69 k	11.7 f-h	5.35 b	2.68 cd	6.54 c-e	4.01 bc
PDE + Trisulfuron-methyl	38.37 f-h	5.82 f-i	14.7 a-d	2.34 i-l	1.85 e-i	6.39 cde	2.85 ij
Chloredazone+ Phenmedipham	55.12 de	7.62 de	13.9 a-e	3.45 f-h	2.2 c-h	7.35 bc	3.59 de
Chloredazone+ Phenmedipham	27.21 j	3.67 k	13.6 a-g	3.55 f-h	2.38 c-g	6.38 c-e	3.31 e-g
Chloredazone + PDE	54.87 e	7.05 d-f	13 c-h	4.32 de	2.41 c-g	6.09 de	3.35 e-g
Chloredazone + PDE	33.66 hi	4.81 j-k	13.9 a-e	2.95 g-k	1.69 hi	6.21 de	2.98 g-j
Clopyralid + PDE	57.90 c-e	8.19 b-d	14.2 a-e	2.76 h-l	2.06 d-h	6.91 b-d	3.19 f-i
Clopyralid + PDE	28.50 ij	4.10 k	14.4 a-e	2.34 i-l	1.57 hi	5.86 e	2.64 jk
Control (without spray)	20.66 k	1.49 l	7.25 i	6.34 a	4.25 a	7.93 a	4.97 a

Means with common letters are not significantly different at 5% of probability (DMRT)
PDE: Phenmedipham+ Desmedipham+ Ethofumesate

contents measured in the weedy check and application of herbicides resulted in increases in sugar content. This reduction could be due to less photosynthesis of sugar beet in competition with weeds because weed leaves reduced the photosynthesis rate of sugar beet by shading (Alimoradi.,1997; Heidari et al., 2007).

White Sugar Yield

Herbicide treatments had significant effects on white sugar yield (Table 3). The treatment of bettanal Progress Am had the highest white sugar yield whereas control treatment (without herbicide) had the lowest one (Table 3). Vencil (2002) reported that the mixture of post emergence herbicides profitably control sugar beet broadleaf weeds. Application of broadleaf herbicides such as bettanal Progress Am can increase white sugar yield by decreasing molasses and harmful elements (sodium, potassium and amino-nitrogen) (Table 3). Bettanal Progress am can control a number of broadleaf weeds in sugar beet by inhibiting photo system II. This herbicide also decreases the photosynthetic activity of sugar beet (Prodoehl and Campbell, 1992). Metamitron, a triazinone, is widely used for pre- or post-emergence broad-leaved weed control in sugar beet. Metamitron is systemic, xylem-trans located photo system II inhibitor. Metamitron is used for selective weed control in sugar beet since it is highly metabolized in this crop (Abbaspoor et al., 2005).

Biochemical Traits

Herbicide treatments had statistically significant effects on sodium, potassium and amino-nitrogen contents molasses (Table 3). The lowest elements were obtained from PDE and the highest value was observed from the control treatment (Table 3). It has been found that in sugar beet, usually more impurities (sodium, potassium, and destructive nitrogen) are associated with more alkalinity in the root pulp and consequently more unachievable sugar (molasses). As a result, the percentage of white sugar is decreased and consequently more molasses (unachievable sugar) are produced (Jafarnia et al., 2013).

CONCLUSIONS

Overall, weed competition caused decreasing root yield up to 84%. The maximum root yield was found in treatment of 4.5 kg metamitron per hectare after cultivation (2, 4-leaf stage) while the minimum root yield was obtained in combination of 5 kg chloredazone and 2 litters desmedipham. Furthermore, herbicide treatments had a significant effect on white sugar content. The treatment of bettanal Progress Am led to the highest and control treatment (without herbicide) resulted in the lowest white sugar yield. The lowest sodium, potassium, amino-nitrogen as well as molasses content were obtained from phenmedipham + desmedipham + ethofumesate and the highest values were observed from control treatment. It can be concluded that applying metamitron and phenmedipham + desmedipham + ethofumesate at both pre-emergence and 2-4-leaf period with recommended dosage could be recommended for obtaining higher root yield and WSC in sugar beet fields.

REFERENCES

Abbaspoor, M., Teicher, H.B., & Streibig, J.C. (2008). The effect of root-absorbed PSII inhibitors on Kautsky curve parameters in sugar beet. *Journal of Weed Research*, 46, 226–235.

Abdollahi, F., & Ghadiri, H. (2004). Effect of separate and combined applications of herbicides on weed control and yield of sugar beet. *Journal of Weed Technology*, 18, 968–976.

Ashrafi, Z.Y., Mashhadi, H.R., Sadeghi, S., & Blackshaw, R.E. (2009). Study effects of planting methods and tank mixed herbicides on weeds controlling and wheat yield. *Journal of Agricultural Science*, 1, 101-111.

Blackshaw, R.E., O'Donovan, J.T., Harker, K.N., Clayton, G.W., & Stougaard, R.T. (2006). Reduced herbicide doses in field crops. A review. *Journal of Weed Biology Management*,6, 10–17.

Dale, T.M., & Renner, K.A. (2005). Timing of post emergence micro-rate applications based on growing degree days in sugar beet. *Journal of Sugar Beet Research*, 42, 87-102.

Dale, T.M., McGrath, J.M., & Renner, K.A. (2005). Response of sugar beet varieties and populations to post emergence herbicides. *Journal of Sugar Beet Research*, 42,119-126.

Deveikyte, I., & Seibutis, V. (2006). Broadleaf weeds and sugar beet response to phenmedipham, desmedipham, ethofumesate and triflusulfuron-methyl. *Agronomy Research*, 4 (Special issue),159–162.

Deveikyte, I., & Seibutis, V. (2008). The influence of post-emergence herbicides combinations on broad-leaved weeds in sugar beet. *Žemdirbystė Mokslodarbai LŽI Akademija*, 95, 43–49.

Dieleman, J.A., & Mortensen, D.A. (1998). Influence of weed biology and ecology on development of reduced dose strategies for integrated weed management systems. *Journal of Weed and Soil Management*, 53, 333-362.

Green, J.M. (1989). Herbicide antagonism in the whole plant level. *Weed Technology*, 3, 217–26.

Hatzios, K.K., & Penner, D. (1985). Interactions of herbicides with other agrochemicals in higher plants.Rev. *Journal of Weed Science*, 1, 1–63.

Heidari, G.h., Dabbagh MohammadiNasab, A ., Javanshir, A., RahimzadehKhoie, F., & Moghaddam, M. (2007). Influence of redroot pigweed (*Amaranthusretroflexus* L.) emergence time and density on yield and quality of two sugar beet cultivars. *Journal of Food Agriculture and Environment*, 5, 261-266.

Jafarnia, B., Ghorbani, R., Zare Feizabady, A., & Ghaemi, A. (2013). Impact of crop density and soil fertilization on sugar beet. *Agriculture and Crop Science*, 5, 2991-2999.

Lajos, K., & Lajos, M. (2000). Weed control with reduced herbicide applications in sugar beets Hungary. *Journal Plant Disease and Protection*, 7, 623–627.

Majidi, M., Heidari, G., & Mohammadi, K. (2011). Management of broad- leaved weeds by combination of herbicides in sugar beet production. *Advances in Environmental Biology*, *5*(10), 3302-3306.

May, M. (2001). Crop protection in sugar beet. *Pesticide Outlook*, 12, 188–191.

Mehmeti, A. (2004) Three-year average effects of herbicides on weeds in potato and the yield of the crop. *Herbologia*, *5*(1), 2004.

Petersen, J. (2004). Rotary band seeding glyphosate resistant sugar beet into dead and living mulch. International Institute of Sugar Beet Research 67th Congress, Bruxelles: 115—129.

Poorazar, R., & Ghadiri, H. (2001). Competition of wild oat (*Avenafatua* L.) with three wheat (*Triticumaestivum* L.) cultivars in greenhouse: Plant density effect. Iran. *Iranian Journal of Crop Science*, 3, 59-72.

Prodoehl, K.A., & Campbell, L.G. (1992). Phenmedipham + desmedipham effects on sugar beet. *Agronomy Journal*, 84,1002–1025.

RashedMohassel, M.H., Najafi, H., & Akbarzadeh, D. (2001). Biology and weed control. Ferdowsi Univeesity of Mashhad Press, Mashhad, Iran.

Reinefeld, E., Emmerich, A., Baumgarten, G., Winner, C., & Beiss, U .1974. ZurVoraussage des Melassezukersaus Rübenanalysen. *Zuker*, 27, 2-15.

Schwizer, E.E., & May, M.J. (1993). Weeds and weed control. In Cooke, D.A. and Scott, R.K. (eds). The Sugar Beet Crop: Science into Practice. Chapman and Hall, London: 485-519.

Scott, R.K., Wilcockson, S.J., & Moisey, F.R. (1979). The effects of time of weed removal on growth and yield of sugar beet. *Agriculture Science*, 93, 693–709.

Vencill, W. K. (2002). Herbicide Handbook (No. Ed. 8). Weed Science Society of America.

Weaver, S.E., & Williams, E.L. (1980). The biology of Canadian weeds: *Amaranthus retroflexus* L., *Amaranthus powellii* S. Wats. and *Amaranthus hybridus* L. *Canadian Journal of Plant Science*, 60,1215–1234.

Wilson, R.G., Smith, J.A., & Yonts, C.D. (2005). Repeated reduced rates of broadleaf herbicides in combination with methylated seed oil for postemergence weed control in sugar beet (*Betavulgaris*). *Journal of Weed Technology*, *19*, 855–860.

Wittenbach, V.A.m., Koeppe, M.K and Lichtner, F.T .1994. Basis of selectivity of Triflusulfuron methyl in sugar beet (*Beta vulgaris*). *Pesticide Biochemistry and Physiology*, 49, 72–81.

Zhang, J., Hamill, A.S., & Weaver, S.E. (1995). Antagonism and synergism between herbicides: trends from previous studies. *Weed Technology*, 9, 86–90.

Zoschke, A., & Quadranti, M. (2002). Integrated weed management: Quo vadis? *Weed Biology and Management*, *2*(1), 1-10.

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بررسی خصوصیات کیفی چغندرقند تحت تأثیر ترکیب‌های مختلف پهن‌برگ‌کش‌ها

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ملاس

درصد قند

چکیده-علفکش‌های زیادی وجود دارند که برای کنترل علف‌های هرز در چغندر قند به ثبت رسیده‌اند، ولی یک علف‌کش به طور خاص وجود ندارد که بتواند تمام علف‌های هرز را به طور کامل کنترل کند. اغلب ترکیب دو یا چند علف‌کش در مخزن سمپاش به صورت متناوب می‌تواند برای رسیدن به کنترل بهتر علف‌های هرز پهن‌برگ مورد استفاده قرار گیرد. به منظور بررسی اثرات ترکیب علف‌کش‌های پهن‌برگ کش روی عملکرد و خصوصیات کیفی چغندرقند آزمایشی در قالب طرح بلوک‌های کامل تصادفی با سه تکرار در ایستگاه تحقیقاتی میاندوآب در آذربایجان غربی در سال ۸۹-۸۸ انجام شد. نتایج نشان داد که علف‌های هرزعملکرد چغندرقند را تا ۸۴ درصد کاهش دادند. بیشترین میزان عملکرد ریشه (۷۳/۶۶ تن در هکتار) ازکاربرد تیمار متامیترون به میزان ۴/۵ کیلوگرم در هکتار در مرحله ۲ تا ۴ برگی و کمترین میزان (۲۰/۶۶ تن در هکتار) از تیمار شاهد بدست آمد. بر اساس جدول تجزیه واریانس تیمارهای علف‌کشی روی درصد قند تأثیر معنی‌داری داشتند. بالاترین درصد قند خالص از تیمار بتانالپراگرسآام (۱۰/۹ تن در هکتار) و کمترین درصد مربوط به تیمار شاهد(۱/۴۹ تن در هکتار) بود. کمترین میزان مواد مضره شامل سدیم ،پتاسیم و آمینو اسید و همچنین ملاس از ترکیب علف‌کش‌های فن مدیفام، دسمدیفام و اتوفومسیت و بیشترین مقدار از تیمار شاهد بدست آمد. به طورکلی رقابت علف‌های هرز باعث کاهش عملکرد ریشه و درصد قند شد وتیمار بتانالپراگرسآام بهترین تیمار علف‌کشی برای کنترل علف‌های هرز پهن‌برگ مزرعه چغندر قند بود.