Burcucumber

Sicyos angulatus L.

Also known as: wild pickle, pickle, star cucumber, nimble kate

Burcucumber is a summer annual broadleaf weed that can be a serious problem in agronomic crops. Because of its prolonged seedling emergence and aggressive, vining growth habit, burcucumber is not easily controlled using only herbicide-based management strategies. Like most weeds, burcucumber cannot be eradicated; however, an integrated approach can reduce infestations and slow or stop the weed's further spread.



Burcucumber overtaking a mature corn field. (Photo credit: Dwight Lingenfelter, Penn State)

Identifying Features

Burcucumber can be identified by its pentagon-shaped leaves, long vines, and spiny seed clusters. The individual seeds are flattened and roughly the size of a watermelon seed, with a hard seed coat. Each one is enclosed in a prickly, fleshy shell or pericarp. The hard seed coat contributes to the burcucumber's prolonged seed dormancy, which means that fields currently infested with burcucumber will have a lasting soil seedbank and the potential for a burcucumber problem for many years. Seeds can germinate from six inches below the soil surface.

Burcucumber typically emerges from late April through mid-August, although plants emerging after mid-July in the Mid-Atlantic region often do not produce viable seed. Vines of some mature plants can be over 20 feet long and can span more than six corn rows. Because of this aggressive growth habit, burcucumber can reduce crop yield significantly and make harvesting of both grain and forage difficult and sometimes impossible.



Burcucumber can progress from seedlings (left), to a vining growth (center) into a full infestation quickly (right), if it is allowed to escape control early in the season. (Photo credit: Dwight Lingenfelter, Penn State).

Burcucumber can be confused with the less common wild cucumber (Echinocystis lobata). Unlike burcucumber's pentagon-shaped leaves, wild cucumber has clearly defined star-shaped leaves and large, prickly, egg-shaped fruits containing numerous seeds; it usually is found along fencerows, woodlands, stream banks, roadsides, and waste areas.



From left to right, a comparison between the leaves, flowers and fruiting structure of wild cucumber (top) and burcucumber (bottom). (Photo credit: UMass Weed Identification Guide)

Seed Production

Burcucumber begins to flower in August and continues to produce flowers until it is killed by frost. Seed clusters composed of two to 30 seeds form shortly after flowering and remain green and fleshy through mid-September. After drying, the seed clusters fragment shatter, depositing the seeds on the ground.



An immature seed inside a burcucumber's fruiting structure. (Photo credit: Dwight Lingenfelter, Penn State)

Herbicide Resistance

Currently, there are no known cases of herbicide resistance in burcucumber.

Integrated Weed Management

Cover Crops

In general, cover crops left on the surface to create a mulch can be a useful tactic for suppressing weed seed germination, establishment and early-season growth. However, since burcucumber can germinate from several inches below the soil surface, it can germinate and emerge through a thick cover crop residue. For example, a recent study showed that more than 75% of burcucumber seeds successfully established when emerging into a cereal rye surface mulch that exceeded 6,000 lb/ac. However, cover crops may help to slow early season growth, which can allow for more timely herbicide applications.

Integrated Weed Management (cont.)

Harvest Weed Seed Control

Since burcucumber seeds mature relatively late in the season, harvesting or destroying the crop early can prevent viable burcucumber seed production.

Table 1. Effect of an eight-week ensiling period on burcucumber seed viability at different seed maturities.

BURCUCUMBER SEED MATURITY	VIABILITY*
Immature (milk to dough stages)	2 %
Mature	87 %

* As compared to nonensiled seeds.
Taken from Messersmith, D. T., M. S. Thesis, Penn State University, 1997.

Penn State research shows that ensiling green or immature burcucumber seed (when still green, cream, or tan colored) is an effective technique for killing viable seed. However, ensiling does not affect mature seed (when dark brown seed coats have developed – see Table 1). This suggests that early harvesting of a crop as silage may prevent viable seed production in burcucumber-infested fields. Silage harvest also prevents mature seed from reentering the field through the combine.

Tillage

Typically, preplant tillage can bury some weed seeds deeply enough to prevent their germination. But since burcucumber can germinate and emerge from depths of up to six inches, tillage can encourage multiple flushes of burcucumber throughout the growing season. Penn State research suggests that burcucumber may be better controlled in no-till fields compared to conventional or minimum-tilled fields. In no-till situations, burcucumber seeds are left near the soil surface where they may not germinate or may germinate over a shorter period during the crop growing season. The apparent advantage of no-till may be due to both a shorter emergence period and better postemergence herbicide performance.

In conventional or reduced-tillage systems, cultivating – especially in conjunction with a herbicide program – may also provide control of burcucumber; however, the impact of cultivation on subsequent burcucumber flushes is not known.

Cultural Crop Production

Row spacing alone has not been shown to be effective at suppressing burcucumber. But using both wide and narrow rows within a larger weed management plan can help suppress other weeds in different ways.

Integrated Weed Management (cont.)

Cultural Crop Production (cont.)

For example, planting soybeans in 30-inch rows can allow for cultivation and for later postemergence herbicide applications, which can be helpful for burcucumber management. And it remains true that the quick canopy closure that occurs in narrower soybean rows also can help to reduce later emerging weeds, including burcucumber.



Burcucumber rapidly encroaching on soybean rows, before canopy closure. (Photo credit: Dwight Lingenfelter, Penn State)

Burcucumber is particularly difficult to manage in corn because mid- and late-season management options are limited and the taller corn canopy can conceal the presence of the weed. However, as mentioned previously, corn harvested for silage can help destroy maturing seeds and help limit adding more seeds to the soil seedbank. Finally, rotating to winter cereals and perennial hay crops can also help reduce burcucumber success and perennial hay crops in particular that allow frequent mowing should help reduce the soil seedbank.

Herbicide Control Options

Good control of burcucumber requires – at a minimum – a two-pass herbicide program, but more applications may be required. Because burcucumber can emerge throughout the growing season, it is difficult to manage with herbicides that lack residual activity. Furthermore, one-pass preemergence herbicide programs will not be adequate either. Seedling burcucumber can be killed with several effective postemergence herbicides; however, season-long control of burcucumber rarely is achieved with any herbicide. Effective management must include both pre and post (foliar-applied) herbicides. Post herbicides provide the best burcucumber control. Post programs that include effective foliar and residual herbicides will enhance season-long control by killing later emerging burcucumber flushes.

Control in Corn

Several corn herbicides provide good control of burcucumber, and they are most effective on young seedlings rather than larger plants. Prosulfuron (Peak), has provided the best season-long control of burcucumber in Penn State field research but be cautious of its long plantback restrictions.

Some two-pass programs that have proven effective include the use of products such as Lexar, Acuron, or Corvus/TriVolt + atrazine preemergence followed by various combinations of these post products – Peak (0.5 oz/acre), dicamba/Status, Callisto/Halex GT/Acuron GT, atrazine, and glyphosate.

	PREEMERGENCE	POSTEMERGENCE
Corn	• atrazine/Group 5 + mesotrione/Group 27 + *S*-metolachlor/Group 15 (Lexar) • atrazine/Group 5 + bicyclopyrone/Group 27 + mesotrione/Group 27 + *S*-metolachlor/Group 15 (Acuron) • flufenacet/Group 15 + isoxaflutole/Group 27 + thiencarbazone/Group 2 (TriVolt), applied with atrazine.	• prosulfuron/Group 2 (Peak, at 0.5 oz/acre) • dicamba/Group 4 (Status) • atrazine/Group 5 • glyphosate/Group 9 • mesotrione/Group 27 (Callisto) • glyphosate/Group 9 + mesotrione/Group 27 + *S*-metolachlor/Group 15 (Halex GT) • atrazine/Group 5 + bicyclopyrone/Group 27 + mesotrione/Group 27 + *S*-metolachlor/Group 15 (Acuron) *For better crop rotation options/lesser plantback restrictions: • glyphosate/Group 9 + mesotrione/Group 27 + S-metolachlor/Group 15 (Halex GT, at 3.6 pt/acre), combined with prosulfuron/Group 2 (Peak, at 0.25 oz/acre)[1]

NOTE: These are examples of effective active ingredients; this may not be a comprehensive list. There may be other tradenames of these active ingredients, and these active ingredients may be a component of premixes, as well. Remember that some herbicides can only be used safely within a crop when combined with a complementary herbicide-tolerant trait system. Always read and follow both the herbicide and seed label. Check with your local Extension weed specialist for recommendations for your region.

[1]According to the Peak label, if the use rate is 0.25 oz and is applied before July 10, then soybeans (non-STS) can be planted next season.

Herbicide Control Options (cont.)

Control in Corn (cont.)

A useful post program for good burcucumber control and better crop rotation options includes Halex GT (3.6 pt/acre) + Peak (0.25 oz/acre). According to the Peak label, if the use rate is 0.25 oz and is applied before July 10, then soybeans (non-STS) can be planted next season.

Make foliar applications to corn within recommended crop-growth stages, and when burcucumber is less than 12 inches long and has not yet vined. Generally, foliar-applied herbicides require additives to be mixed with the spray solution. When appropriate, apply the post herbicides as late as possible (e.g., 24- to 36-inch-tall corn) to extend the residual control later into the season. In some cases, the use of drop nozzles may be helpful if corn is too tall. In general, late season control of burcucumber using herbicides is unreliable. In addition, these types of later applications are only possible if using herbicides that are labeled for this purpose.

Control in Soybeans

Burcucumber control in soybeans can also be challenging. But because burcucumber can be better monitored in soybean canopies, rescue herbicide treatments and later access are more feasible than in corn. Planting soybeans in 30-inch rows can allow for cultivation and for later postemergence herbicide applications; however, the quick canopy closure that occurs in narrower rows also can help to reduce later emerging weeds, including burcucumber.

	PREEMERGENCE	POSTEMERGENCE
Soybeans	• metribuzin/Group 5 + sulfentrazone/Group 14 (Authority MTZ) • chlorimuron/Group 2 + sulfentrazone/Group 14 (Authority XL) • chlorimuron/Group 2 + metribuzin/Group 5 (Canopy). • chlorimuron/Group 2 + flumioxazin/Group 14 + thifensulfuron/Group 2 (Envive) • chlorimuron/Group 2 + flumioxazin/Group 14 + pyroxasulfone/Group 15 (Fierce XLT) • flumioxazin/Group 14 + imazethapyr/Group 2 + metribuzin/Group 5 (Panther Pro) • imazethapyr/Group 2 (Pursuit) • chlorimuron/Group 2 + flumioxazin/Group 14 + metribuzin/Group 5 (Trivence) • chlorimuron/Group 2 + flumioxazin/Group 14 (Valor XLT)	• chlorimuron/Group 2 (Classic, Synchrony) + glyphosate/Group 9 + glufosinate/Group 11 (Liberty) in Enlist and XtendFlex systems or dicamba/Group 4 in Xtend systems

NOTE: These are examples of effective active ingredients; this may not be a comprehensive list. There may be other tradenames of these active ingredients, and these active ingredients may be a component of premixes, as well. Remember that some herbicides can only be used safely within a crop when combined with a complementary herbicide-tolerant trait system. Always read and follow both the herbicide and seed label. Check with your local Extension weed specialist for recommendations for your region.

Herbicide Control Options (cont.)

Control in Soybeans (cont.)

Split-applications (i.e., pre and post) of herbicides might be necessary for best control of later emerging burcucumber seedlings. Soil-applied treatments in soybeans will not provide adequate control of burcucumber. Although several preemergence herbicides can suppress (60-70%) burcucumber growth, an additional foliar-applied herbicide will be necessary for season-long control. In general products that contain chlorimuron and/or metribuzin provide the best initial early season suppression of burcucumber. These soil-applied products include: Authority MTZ 45DF (sulfentrazone + metribuzin), Authority XL 70WG (sulfentrazone + chlorimuron), Canopy 75DF (chlorimuron + metribuzin), Envive 41.3WG (chlorimuron + flumioxazin + thifensulfuron), Fierce XLT 62.41WG (pyroxasulfone + flumioxazin + chlorimuron), Panther Pro 4.23SC (metribuzin + flumioxazin + imazethapyr), Pursuit 2AS (imazethapyr), Trivence 61.3WG (chlorimuron + metribuzin + flumioxazin), Valor XLT 40.3WG (flumioxazin + chlorimuron). Of all these, Canopy tends to provide the best initial control.

Make postemergence (foliar) applications to soybeans within recommended crop-growth stages, and when burcucumber is less than 12 inches long and has not yet vined. Herbicides containing chlorimuron (Classic, Synchrony) have provided the most consistent control of burcucumber in Penn State field studies. Chlorimuron provides both foliar and residual activity on burcucumber. In Enlist E3 soybeans, Enlist One is typically not that effective on burcucumber, however, approved dicamba products in XtendFlex platforms can provide effective foliar control of burcucumber. In both those systems, it is best to tank-mix glyphosate or glufosinate (Liberty) in the post application to improve control. Make sure the soybean variety has tolerance to the herbicides that will be applied. Generally, foliar-applied herbicides require additives to be mixed with the spray solution.

Control in Alfalfa and Small Grains

Burcucumber is less of a problem in alfalfa or small grains, and a herbicide application often is not necessary. An exception may apply with new spring-seeded forages or cereals such as spring oats. Because of its seed longevity, burcucumber may become problematic again when a field is rotated back to corn or soybeans.

Herbicide Control Options (cont.)

Control in Alfalfa and Small Grains (cont.)

In established alfalfa stands, frequent cutting can prevent significant burcucumber competition. In new spring seedings, Maestro 2E (bromoxynil) will control small burcucumber plants in newly seeded alfalfa. Apply 1 to 1.5 pints of Maestro 2E to spring-seeded alfalfa with at least four trifoliate leaves. Unacceptable crop injury may occur if Maestro is applied when temperatures are expected to exceed 70°F at or during the three days following application.

Small grain crops can compete well with burcucumber because of their vigorous growth and dense canopy in the spring. Also, small grains are harvested before burcucumber has a chance to reach a significant size and interfere with the crop. Burcucumber may compete with spring oats, however, especially if the oats are seeded late in the spring. For small infestations, hand pulling the burcucumber is recommended. If burcucumber begins to thrive, harvest the oat crop as a forage, or apply 0.5 ounce of Peak 57WG per acre or Harmony Extra SG 50WG at 0.45 to 0.9 ounce per acre. Include an appropriate spray additive in the spray mixture. Maestro 2E at 1 to 2 pints per acre also could be applied to reduce burcucumber competition. Refer to the specific product label for information on application and crop rotations.

Spot Treatments, Harvest Aid Applications, and Nonselective Control

Corn Harvest Aids		
Carfentrazone Group 14 (Aim)	2 fl oz	May be applied 3 days before harvest. Apply in 10 gal/A water. Include necessary adjuvants and make sure spray coverage is sufficient otherwise poor control will result.
Bentazon Group 6 (Basagran)	1.5 to 2 pt	Include appropriate adjuvants in the spray mixture. No specific restrictions are provided on the label.
Glyphosate Group 9	Up to 0.75 lb ae	Apply to corn a week or more prior to harvest. Include necessary adjuvants to improve performance. Must be applied to grain when moisture is 35% or less and after maximum kernel fill.
Paraquat Group 22 (Gramoxone)	0.8 to 1.3 pt	Compared to the other options, Gramoxone/paraquat is probably the most effective pre-harvest herbicide in this situation. Apply after black layer and at least 7 days before harvest. The higher rate can be used to desiccate mature broadleaves and grasses over 18 inches tall. Be sure to include a nonionic surfactant.
2,4-D ester 4L Group 4	1 to 2 pt	Apply after the hard dough or dent stage. Use higher rates on larger weeds and those under stress. Do not forage or feed corn fodder for 7 days after application.

See specific product label to determine correct rate, timing, weed species controlled, and other restrictions with this type of application.

Glyphosate can be used to control emerged burcucumber prior to planting, or for burcucumber control in noncropland areas. Glyphosate also can be used to spot-treat heavy infestations in a crop to prevent burcucumber seed production. Apply 1 to 1.5 quarts of glyphosate per acre in 10 to 20 gallons of water per acre. For smaller areas, mix glyphosate at a 1 percent solution rate (1.3 fluid ounces per gallon of water).

Herbicide Control Options (cont.)

Spot Treatments, Harvest Aid Applications, and Nonselective Control (cont.)

If burcucumber cannot be removed with corn silage harvest (as previously suggested), harvest-aid herbicides are generally not effective on burcucumber and will not necessarily control the weed before grain harvest. In most cases, if the corn is harvested for grain, the mature seeds will simply end up back in the field (or in the grain) making the problem worse for future years. But if necessary, paraquat (Gramoxone, others) is usually the most effective pre-harvest herbicide in this situation.

However, other late-season corn herbicide options are listed in Table 2 and may provide some suppression and desiccation. Keep in mind, in corn, this type of application requires high clearance equipment or aerial application. Herbicide applications made during this late timeframe are used primarily to help desiccate green weed tissue to improve the harvesting process. Herbicides such as glyphosate, paraquat, Aim, and Clarity (dicamba) can be used as harvest aids prior to soybean harvest. In most cases, contact herbicides are usually better as harvest aids; however, it can vary by weed species and usually will require at least a week or more to desiccate weeds. Some of these herbicides are not that effective on large weeds or certain species. Harvest aids are not intended to (and usually do not) help speed up crop maturity. If applied too early they can interfere with the natural crop maturation process. Illegal herbicide residues can result if specific application timing and other label guidelines are not followed. See specific product label to determine correct rate, timing, weed species controlled, and other restrictions with this type of application.

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Resources

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Citations

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