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Cuphea Grower Guide 2003

Seedbed preparation

- a. Field size and shape
 It is recommended that cuphea be grown in fields no larger than 10 acres. The field shape should be long and rectangular whenever possible. It is highly recommended that cuphea be grown in relatively weed-free fields as it is not a strong competitor with weeds during the early part of the growing season.
- b. Soil
 Cuphea should be grown on medium textured soils with moderate to good drainage and a pH range of about 6 to 7.5. Avoid sandy soils and poorly drained soils that are prone to water logging. Soils with electrical conductivity greater than 10 mmho/cm (10 deciSiemens/m) should be avoided. The seedbed should be relatively well worked prior to planting with as few large soil clods and as little surface residue as possible.
- c. Rotational sequence
 Plant cuphea where soybean was grown the previous year or at least on ground that will be planted to corn the following growing season, as cuphea has beneficial effects on corn by reducing corn rootworm populations.

Fertility

Due to rather poor root development of cuphea on many soils, banding of fertilizer offset from the crop row is highly recommended. The band application should be made 2 inches to the side and 2 inches below the planting depth (a ½ inch is the recommended planting depth). Cuphea seed is rich in sulfur and potassium. Therefore, it is recommended for most soils that 40 lbs/acre of potassium sulfate or 0-0-20-7 be applied, preferably by banding, along with 200 lbs/acre di-ammonium phosphate or 39-92-0, and 100 lbs/acre of urea or 46-0-0. Broadcasting fertilizer and incorporating into the top 6 inches of soil prior to planting is an option if banding cannot be done.

Planting

- a. Date
 Recommended planting time in west central Minnesota is May 1st to May 15th. Soils that are too wet and cold can lead to poor stand establishment, and planting too late (i.e. late May & June) does not allow plants enough time to fully mature in this region. Dates of planting may have to be slightly adjusted according to the specific region where cuphea is grown. Much like soybean, soil temperature at planting should be 50EF or greater.

b. Depth

The recommended planting depth for cuphea is ½ inch. Avoid planting any deeper than ¾ of an inch.

c. Rate and row spacing

The recommended seeding rate for cuphea is 8 lbs/acre (note: if using coated seed, the rate should be about doubled {i.e. 14 to 16 lbs/acre}). It is recommended that cuphea be seeded with a grain drill into rows spaced 22 to 30" apart. This can be done by blocking some drill openers as necessary to get the recommended row spacing. Care needs to be taken to not break seed when calibrating the seeder and planting, as this will cause stand loss.

Cuphea grows indeterminately and therefore tends to have good yield compensation when stands are sparse. Because of this, yields are more greatly affected by plant population density than row spacing. The optimum plant population ranges from about 200,000 to 300,000 plants per acre.

Weed control

a. Preplant herbicides

Broadleaf weed control is a problem in cuphea. Soil applied herbicides have shown the greatest promise. As of spring 2004, cuphea has been found to tolerate four soil-applied herbicides.

- 1) Preplant incorporated herbicides such as Treflan and Sonalan are tolerated well by cuphea. Apply Treflan (4MTF) at 1-2 pints/acre or Sonalan (3EC) at 2-3 pints/acre, then incorporate lightly with a disk or harrow.
- 2) Preemergence herbicides such as Balance Pro (4SC) at 2 oz/acre or Callisto (4SC) at 6 oz/acre are tolerated well by cuphea. Balance is not a labeled herbicide in Minnesota.

b. Postemergence herbicides

Grass weed control in cuphea can be accomplished with any of a number of graminicides (herbicides that kill only grasses). Control of grasses can be accomplished with Poast (1.5 EC) at 1 pint/acre and Poast Plus (1.0 EC) at 1.5 pints/acre. Crop safety using postemergence broadleaf herbicides is much more difficult, but a few products are available.

- 1) Callisto (4SC) at 3 oz/acre. Always add crop oil concentrate (COC) at a rate of 1:100 v/v (that is, 1 quart COC to 25 gallons of water. Never tank mix with Poast. Callisto can be applied postemergence successfully after preemergence applications of Balance or Sonalan, but not Treflan.
- 2) Pursuit (2AS) at 3 oz/acre or Pursuit (70DG) at 1.08 oz/acre. Use of 0.25 v/v nonionic surfactant (1 qt/100 gal water) and 1 qt/acre of liquid fertilizer is recommended. Expect some crop damage with Pursuit, but the cuphea should regrow.

c. Cultivation

Cultivation can be successfully used to control weeds in cuphea. And, it is highly recommended in areas where the recommended herbicides do not control the full spectrum of weed species present. However, because cuphea grows slowly early in the season it is necessary to use soil guards on each side of the cultivator's disks or sweeps to prevent soil from burying plants in the rows. Cultivation should not be done until cuphea plants are at least 6 to 10 inches tall. In a typical year for west central Minnesota this would be around mid June if planted in early to mid May.

Though cuphea grows slowly during early summer, it becomes quite vigorous by mid July, quickly forming a very dense canopy that will choke out any late season weeds

Irrigation

Irrigation is strongly recommended for cuphea production, especially on coarse textured soils and where weather conditions stay hot and dry for extended periods of time during the growing season. For a loam-type soil, keeping soil moisture at 50% field capacity or greater can significantly boost cuphea yields. Since 2000, research at the USDA-ARS lab in Morris, MN shows that water is a critical factor in the growth and development of cuphea. Partly, this is because cuphea does not have a deep root system, and it has low water use efficiency in terms of seed production. Signs of drought stress such as plant wilting and leaf rolling have been observed late in the growing season when conditions are hot and dry. However, cuphea can quickly recover after receiving adequate rain or irrigation, although yields can be affected adversely if dry conditions prevail for an extended time during flowering and seed set.

Flowering and Pollination

Flowering typically begins in mid to late July and continues throughout August and early September. It is recommended that one honeybee hive per acre be placed in or adjacent to cuphea fields, especially where the goal is production of seed for future plantings. The cuphea variety PSR23, is believed to be strongly cross-pollinated by winged insects, particularly bees, although laboratory and field observations indicate that there is some self-fertilization of flowers. Field observations at Morris, MN, indicate the cuphea plots are frequently visited by honeybees, bumble bees, and various other winged insects, which work the flowers for pollen and presumable aid in cross pollination of flowers.

Harvesting

a. Date

The recommended harvest time for cuphea in the northern Corn Belt is mid September through early October. Cuphea continues growing until killed by a hard frost, although physiological maturity is about 100 to 110 days. Freezing helps dry plant material making direct combine harvesting easier.

Seed pods will begin shattering in mid to late August. Despite this, delaying harvest until mid September results in greater yields.

b. Desiccants/defoliant

Desiccants can be used as a harvest aid to dry and partially defoliate plants before harvesting. Defol (sodium chlorate) can be used at a concentration of 8 oz./gal of water. For fast results, a mixture of 8 oz./gal of Defol and 1.5 oz./gal of paraquat can be used.

However, if the harvested seed is going to be used for planting, desiccants **should not** be used, as we do not know the effect that either Defol or paraquat has on seed viability and germination.

c. Swathing and windrowing

Only limited information is available for swathing and windrowing. Cut the cuphea at a stubble height of 8", immediately swath the plants in windrows, and allow the windrows to dry for two to three weeks (14-21 days). Although some seeds will be lost due to shattering in the windrows, these losses are offset by ease of combining dry rather than wet plant material.

d. Combine settings

- 1) Direct combining using a "bean" style header is recommended.
- 2) Cylinder speed should be kept at 1000 rpm or more.
- 3) Cylinder to concave spacing should be as close as possible to facilitate efficient threshing of pods.
- 4) Wind (blower fan) should either not be used or be set as light as possible. Where applicable, wind should be directed as vertical as possible. Cuphea seed is small, very light-weight, and too much air will blow seed out of the combine.

- 5) Sieve openings should be kept fairly small. The objective is to get rid of most of the chaff via the straw walkers.
- 6) It is recommended that the combine reel be kept as far out in front of the head as possible. Reel speed should be set at about the same as ground speed. Avoid aggressive reel speed.
- 7) When direct combining cuphea, keep the head about 8 inches off the ground. Most cuphea seed will be found in the upper half of the plant.

Note: using these recommendations will result in relatively clean seed, containing about 10 to 15% chaff.

Drying seed

Freshly harvested cuphea seed often has 30 to 50% moisture. It is recommended that cuphea seed be dried as soon as possible after harvest. This can be done with a batch drier set up for drying canola seed (small-hole screen) at a temperature of 110EF. If one does not have immediate access to a drier, the seed can be put into a grain wagon with aerator tubes placed about 6 to 8 feet apart. This will prevent heating and subsequent molding and damage to seed for up to 3 to 4 days.

Seed storage

A bushel of clean cuphea seed at approximately 11% moisture weighs 43 lbs. Seed should be stored as clean as possible under cool, dry conditions at a seed moisture content of 10 to 15%.