Crop Profile for Beans (Lima) in Delaware

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General Production Information

- Annually, 40,000 acres of lima bean (*Phaseolus lunatus* L.) are planted in the United States with production concentrated in the mid-Atlantic, California, the Pacific Northwest, and certain areas in the Midwestern states of Wisconsin, Illinois, and Minnesota (1).
- Approximately 10-12,000 acres are planted and harvested in Delaware each year (1).
- From 1994 to 1996, Delaware production averaged 0.94 Cwt./A for a total of 9,900,000 Cwt. (7).
- The cash farm income to lima bean producers in Delaware for the years 1994 to 1996 was $3,417,000, $2,989,000, and $3,733,000 respectively (7).
- Delaware plants more acreage annually for process purposes than any other state (1).
- The total cost to produce an acre of lima bean is $263.97 (1).

Production Regions (1)

Production in Delaware is concentrated in Sussex County.

Cultural Practices

In Delaware, lima beans are considered the cornerstone crop of the vegetable-processing industry. Lima beans are double-cropped on as much as three-fourths of the acreage, thus offering producers maximum utilization of the land. Limas are often planted in June or July after a pea or small grain crop. The same harvesting equipment is used for peas (*Pisum sativum* L.) and lima beans, so capitalization costs can be spread over two crop years.

Typically, the grower contracts with a processing company for a certain acreage. In most cases, the processing company performs the harvest and raw product delivery functions, although there are instances of growers owning their own harvest equipment. In the latter case, the processor pays a higher price for the lima beans.

Many factors influence lima bean yields, but weather conditions that affect flower bud development,

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pollination, and pod maturation have the most impact on yields in Delaware. Low lima bean yields are associated with profuse abscission of flowers and developing pods. Research conducted at the University of Delaware in the 1970s revealed that high temperatures, low relative humidity, and low soil moisture lead to reduced pod set and retention. Temperatures of 90 degrees Fahrenheit or above reduce pollination and pod set. Prolonged drought (7 days or more with less than 1 inch of water) also negatively effects yield. High humidity favors pollination and pod set and is one reason lima beans have been grown successfully in Delaware. Fogs, heavy dews, and their moderating effects on temperature are helpful in pollination and pod set. High night temperatures also adversely affect yields, because energy is consumed through respiration, thereby limiting the plants physiological ability to set and retain pods. Interestingly, Delaware yields generally increase with later planting dates, which corresponds to both higher rainfall, cooler day temperatures, and cooler night temperatures in September and October, at a time when later plantings are flowering and setting pods.

The pH of the soil should be adjusted to 5.8 to 6.5. On most soil types in Delaware, pH in this range provides the optimum availability of plant nutrients. A pH of 6.5 to 7.0 will generally not be detrimental to lima bean yields, although manganese deficiencies could occur on sandy soils at a pH higher than 6.5. Liming to reach a pH of 6.5 or greater is unnecessary.

Baby lima beans may be planted as early as May 15 and as late as July 15. Fordhook lima beans cannot be planted after July 10, because their long maturity will not escape frost at the later dates. The earliest planting are subject to reduced stand due to cold soils. Minimum soil temperature for best germination is 65 degrees. The latest plantings must mature before frost, hence early-maturing varieties must be planted after July 10. The optimum range is May 30 to July 10. Early plantings that mature in August and early September are subject to reduced yields from heat and drought.

Research completed in the `50s, `60s, and early `70s in Delaware indicated a positive response from irrigation, especially on lighter, sandy soils. However, temperatures above 90 degrees can override the possible benefits of irrigation by causing blossoms to drop. There is a significant amount of lima bean acreage planted under dryland conditions in Delaware. Growers face the management decision of what crops offer the best potential return under irrigation. Although there is strong evidence of lima bean response to irrigation, other crops may offer better utilization of irrigation than late-season beans. However, there is little doubt than even in late-season conditions, irrigation reduces risks and offers better yield potential than non-irrigated conditions.

Insect Pests

Insect pests that attack lima beans include the seed corn maggot, lygus bug species, stinkbugs, spider mites, aphids, leafhoppers, Mexican bean beetles, and corn earworms. Because significant acreage of lima beans is planted in June and July, late-season corn earworms are a major economic pest. In recent years, lygus bugs and stinkbugs have become important pests of lima beans in the Mid-Atlantic region.

Seed Corn Maggot:
This insect is primarily a problem in early-planted lima bean fields, especially during cool, wet growing seasons. Only a few maggots per seed or plant can significantly reduce stands. Maggots overwinter as puparia in the soil with flies emerging as early as late February. Outbreaks are favored by planting into freshly plowed ground that is high in organic matter; freshly manured fields; and/or heavy crop residues (e.g. small grain covers) where spring tillage is delayed and/or surface residue is visible after spring tillage operations.

Monitoring: Scouting and applying rescue treatments after the damage is observed are ineffective. Management options must be applied to high-risk fields prior to planting.

Controls:

Biological: - None Available

Cultural: The use of cultural management practices before planting are critical to reduce the potential for economic problems. A combination of the following cultural strategies can be used: (1) plow down cover crops at least 3-4 weeks before planting or transplanting, (2) completely bury cover crops or previous crop residue to reduce fly attraction to rotting organic matter on the soil surface, and (3) avoid the use of heavy manure applications close to planting

Chemical: Currently available seed treatments and soil insecticides provide only fair control, especially under heavy seed corn maggot pressure. The use of a seed treatment containing diazinon or chlorpyrifos can help to reduce damage. In recent years, the use of diazinon 50W as a seed treatment at a rate of 1/2 oz per bushel of seed has provided the most effective control. The use of soil insecticides labeled for lima beans has only provided fair control.

- **Disyston 15G -** Apply 6 - 12 oz per 1000 foot of row. Provides only poor to fair control. Applied at planting only, to less than 5% of the acreage.
- **Thimet 20G -** Apply 4.6 - 6.9 oz per 1000 foot of row. Provides only poor to fair control. Applied at planting only, to 20% of the acreage.

Spider Mites:
Spider mites can be a problem in lima beans, especially during hot, dry weather. Damage will first appear as a white stippling on the leaves with eventual plant death if economic levels go undetected. They are primarily found on the undersides of leaves making the leaves appear tan or yellow in color. Mites feed on the plant sap and can defoliate fields in a few weeks in hot, dry weather. Defoliated plants will produce poor yields and quality beans.

Monitoring: Since mite infestations can begin along field margins next to grassy areas, be sure to carefully sample these areas early in the season. Once populations explode in hot, dry weather, control is

extremely difficult. Look for the early signs of white stippling at the base of the leaflets. Mites can be identified by shaking leaves onto a sheet of white paper and watching for moving specks or by using a hand lens to count the number of mites per leaflet. From early July through mid-August, examine 5 leaflets in 10 location throughout a field for the presence of mites and feeding damage. A treatment should be applied when white stippling is first noticed and you find 20 or more mites per leaflet.

Controls:

Biological: None

Cultural: None

Chemical:

- **dimethoate 4EC -** 0 day PHI; 1 pt/A; applied 2- 4 times per acre to 50 % of the acreage in outbreak years. In recent years, control has been extremely poor. This may be a result of poor coverage, resistance, storage conditions of the chemical, and/or high pH/iron content of the spray water.
- **Kelthane MF -** 7 day PHI; 1 pt/A; Applied 2- 3 times per acre to 50 % of the acreage in outbreak years. In recent years, control has been extremely fair to good.

Mexican Bean Beetle

This insect is the major defoliating pest of beans in the mid-Atlantic region. In recent years, weather conditions have helped to reduce population levels in the region. Adult beetles overwinter in hedgerows, ditchbanks and woodlands near host crops. Adults become active in late April to mid-May. If overwintering populations are heavy, damage can occur in early-planted lima beans at plant emergence. In general, economic levels of the Mexican bean beetle (MBB) are not found before late July. Both adults and larvae can cause damage to beans. Feeding damage can reduce bean yields and pod quality if defoliation exceeds 10%, especially after bloom.

Monitoring: At plant emergence, sampling should begin on a weekly basis along field margins next to overwintering sites. When plants are small, examine the undersides of all plants in 3 foot of row and count the number of adults and larvae and estimate the percent stand reduction or defoliation. Since populations of overwintered adults tend to occur in "hotspots', be sure to note the predominant life and the location of the infestation. When plants are larger, a sweep net or drop cloth should be used to assess the population. Before the first trifoliate stage, a treatment should be considered if you find 6 or more beetles per row foot and no more than a 25% stand reduction. At the first to third trifoliate, the treatment threshold is 2 or more beetles per plant and 20% defoliation. After the third trifoliate and before the bud stage, treatment is suggested if defoliation exceeds 20 percent. From the bud stage until harvest, treat if defoliation exceeds 10% and populations are increasing.

Controls:

Biological: On farms with a succession of bean plantings, the release of the parasite, *Pediobius foveolatus,* may provide effective control. **Caution:** This system has only been demonstrated on soybeans and additional information will be needed to demonstrate its effectiveness on lima beans.

Cultural Controls: The use of an early planted trap crop for overwintered beetles may be effective forcontrolling MBB in later plantings of lima beans. A trap crop consisting of a mixture of snap beans and soybeans planted at least 3 weeks before the main crop will attract overwintering beetle. Beetles found in the trap crop could then be control by plowing under or spraying the trap crop with an insecticide. **Caution:** This system has only been demonstrated on soybeans and additional information will be needed to demonstrate its effectiveness on lima beans

Chemical:

- **Disyston 15G -** 6 - 12 oz per 1000 foot of row; applied at planting only, to less than 5% of the acreage.
- **Lannate LV -** 1 day PHI; 1.5 - 2 pt/A; 1 application, to 10 % of the acreage
- **Orthene 75S -** 0 day PHI; 0.67 - 1.33 lb/A; 1 application, to 0% of the acreage
- **Sevin 80S -** 0 day PHI; 0.67 lb/A; 1 application, to 0% of the acreage
- **Thimet 20G -** 4.6 - 6.9 oz per 1000 foot of row; applied at planting only, to 20% of the acreage.

<u>Potato Leafhopper</u>:
During the 1997 and 1998 growing seasons, significant damaged occurred to seedling stage lima beans. Early migratory populations combined with dry weather conditions resulted in an early increase in leafhopper populations. Plants appear yellow and stunted, with the typical "hopper burn" damage on the tips of the leaves. Both yields and plant maturity can be affected by leafhopper feeding from the seedling to pre-bud stage. Once pods are present, economic damage is less likely to occur.

Monitoring: Fields should be sampled for leafhopper adults and nymphs on a weekly basis from the seedling through the pod development stage. A standard 15-inch sweep net should be used to take 10 sweeps in 10 locations. A treatment should be applied if you find 5 or more leafhoppers per sweep during the prebloom stage, 10 per sweep during the bloom stage, and 25 per sweep during pod development.

Controls:

Biological: None

Cultural: None

Chemical:

- **dimethoate 4EC** - 0 day PHI; 0.5 - 1 pt/A; 1 application, to 20% of the acreage
- **Lannate LV** - 1 day PHI; 1.5 - 2pt/A; 1 application, to 20% of the acreage
- **Orthene 75S** - 0 day PHI; 0.67 - 1.33 lb/A; 1 application, to 0% of the acreage
- **Sevin 80S** - 0 day PHI; 0.67 lb/A; 1 application, to 0% of the acreage

Bean Aphid:
The black bean aphid is the predominate species found in Delaware lima bean fields. In recent years, it has only been a sporadic pest. It overwinters in the egg stage on euonymus shrubs and migrates to weed hosts in the spring. Movement from weed host to lima beans generally occurs in June. Aphids are found on the undersurface of leaves and on the terminal buds. Infested plants appear yellow with puckered foliage. Feeding damage results in bud and blossom abortion. A dark sooty mold also grows on the honeydew excreted by the aphids resulting in reduced photosynthesis and reduced yields.

Monitoring: Fields should be sampled weekly from the seedling to the pre-bud stage. Examine 5 terminals in 5 to 10 locations for the presence of aphids and beneficial insects. Treatment is suggested if 50% or more of the terminals are infested with 5 or more aphids/terminal, aphids can be found throughout field and few beneficial insects can be found.

Stink Bug and Lygus Bug Species:
In recent years, this complex of insects has caused significant losses in processing lima beans. Yield losses can occur from adults or nymphs feeding on the blossoms resulting in blossom abortion. However, the primary losses occur for processors when feeding damage occurs on pin stage beans. Although a field may be harvested with no apparent damage, the resulting feeding scars appear when the beans are processed at the plant. These feeding scars can result in the loss of an entire load with significant economic loss to the processor.

Monitoring: Fields should be sampled twice a week from the bud stage through harvest for adults and nymphs. A standard 15-inch sweep should be used to take 5 sweeps in 10 locations throughout the field. A treatment is suggested if 15 or more adults and/or nymphs can be found per 50 sweeps. Sampling should be done in early morning or late afternoon when insects are most active

Controls:

Biological: None

Cultural: None

Chemical:

- **dimethoate 4EC -** 0 day PHI; 0.5 - 1 pt/A; 1 application, to 25% of the acreage; Only effective on lygus bugs species
- **Lannate LV -** 1 day PHI; 1.5-2 pt/A; 1-2 applications, to 80% of the acreage; works on lygus

species and stinkbug

Corn Earworm:
The corn earworm is the major pod feeder of lima beans in the mid-Atlantic region. Although fall armyworm can also be found, populations levels are not as high and control decisions would be the same. Egg laying activity in lima beans increases significantly in mid to late August when moths shift their egg laying to late planted vegetable crops. Damage to pin and flat pods results in complete bean loss since these pods will fail to develop or drop off the plants. Damage to larger maturing pods results in bean yield loss and quality loss due to broken beans. Feeding damage from one large corn earworm can cause a loss of 30 to 40 lima beans.

Monitoring: Sampling for earworm should be done twice a week beginning at full bloom and continue until 5 to 7 days from harvest. A standard 3-foot drop cloth should be placed between 2 rows and the plants shaken vigorously to dislodge larvae from the plants and onto the cloth. Ten sites should be sampled per field. The treatment threshold is 1 or more larva per 6 ft. of row. When possible, treatment should be delayed until 1/3 of the larval population has reached 1/2 inch in size. Treating too early will eliminate natural controls and may result in additional sprays.

Controls:

Biological: Naturally occurring parasites, predators and disease can play an important role in controlling the corn earworm. Therefore, the use of an economic threshold becomes critical, A fungal disease present during cool, moist periods in September can help to reduce corn earworm populations. **Caution:** These natural controls often do not work quick enough to prevent losses in lima bean yield and quality during years of heavy population pressure.

Cultural: None

Chemical: Although a number of insecticides are labeled for corn eaworm control in lima beans (i.e Orthene), they have provided poor control, especially if a mixed size of earworms are present at the time of treatment. The only available material for earworm control at the present is Lannate. In an outbreak year, 80-90% of the acreage will be treated.

- **Lannate LV -** 1 day PHI; 1.5-2 pt/A; 1-3 applications (3 only in years of extreme pressure), to 50% of the acreage; This rate will only control small corn earworms.
- **Lannate LV -** 3 day PHI; 3 pt/A; 1-2 applications, to 30-40% of the acreage; this rate needed with a mixed size of larvae

Diseases

Disease	Sampling	Frequency	Threshold
Bacterial Brown Spot	Scout 5 plants in 5-10 locations. Look for reddish-brown irregular shaped spots on leaves.	Weekly	Presence

NOTES: Fixed copper is of some value in reducing spread where incidence is low. Troublesome in irrigated fields.

Disease	Sampling	Frequency	Threshold
Downy Mildew	Scout fields. Look for white downy mold on pod and flower racemes under humid conditions. A new race E is main problem in Delmarva. Resistant strains to this race not yet available.	Weekly in late summer / early fall	Presence

NOTES: Conditions favorable for disease development: >1.2 inches rain/7 days + average daily temperatures < 78ºF (25.6ºC). Periods of fog or heavy dew lower amount of rainfall necessary for infection. If a period of 90ºF occurs, the cycle is broken and an additional 7 day period with the above weather conditions is necessary to start infection.

Disease	Sampling	Frequency
White Mold	Check soil moisture during rainy periods. Place a rain gauge in the field, use a portable tensiometer and the correct forms for forecast-ing. Forecasting valid for fields up to 30 acres.	Begin 26 - 28 days after planting. 2X per week until post-bloom

Threshold	Notes
Prior to Bloom: ≥ 6-10 days of wet soil conditions. **Forecasting:** See white mold chart.	White mold is generally only a problem in PA where close row spacing may create favorable environmental conditions. **Treatment:** apply when 70-80% of plants have ≥ 1 open blossom.

Cultural Control Practices(2)

Baby Lima Varieties

- M-15 (80 days) - An early maturing variety with resistence to race A, B, C and D of Downy mildew. A small, compact plant, it has been a consistent yielder. Its small size and tendency to

set pods on the end of racemes can reduce recovery of raw product by the pod stripper type of harvesters.

- Eastland (82 days) - A dependable variety closely related to M-15. It has resistence to races A, B, C, and D of Downy mildew. With a fairly upright plant architecture, it is conducive to harvest by pod stripper combines. It is widely planted in Delaware.
- 8-78 (85 days) - A larger plant type that has yielded consistently well in Delaware. It has resistance to races A, B, C and D of Downy mildew. It larger, more upright habit is conducive to harvest by pod stripper combines. It is widely planted in Delaware.
- 184-85 (86 days) - A larger plant type that sets very few pods in the lower portion of the plant, thus making it more conducive to harvest by pod stripper combines. A good yielder, it has resistance to races A, B, C and D of Downy mildew. It has been more widely planted in recent years.
- Jackson Wonder (85 days) - A speckled bean grown and packed for speciality markets, primarily in the Southern region of the United States. It has no resistance to Downy mildew. There is a Jackson Wonder AR, which has resistance to Anthracnose.
- 16607 (83 days) - A new variety with resistance to A, B, C and D of Downy mildew. It has shown good yielding potential in yield trials and is recommended for planting on a trial basis, subject to seed availability.
- Packers (85 days) - A variety with no resistance to Downy mildew, but has shown good yielding ability in late plantings. It has not done well in early plantings.

Fordhook Varieties

- F1072 (95 days) - The standard Fordhook variety and is resistant to races A, B, and C of Downy mildew. It has shown sensitivity to high temperatures and drought.
- 90-1 (95 days) - A recent release from the USDA with resistance to A, B, C and D of Downy mildew. It has not yielded significantly higher than the F1072 in Delaware yield trials. It does have a larger berry size than F1072.
- F5516 (95 days) - A new release that has out yielded all other Fordhook varieties in the 1994 and 1995 Delaware variety trials. It has resistance to races A, B, C and D of Downy mildew. It is recommended for trial plantings, subject to seed availability.

Weeds

Processing Lima Bean IPM Field Guide For Weeds (3,6)

Scout once prior to harvest to determine weed potential for next season's lima beans

Weeds	Sampling	Threshold

Perennials: Horsenettle, Groundcherry, Yellow Nutsedge, Common Milkweed, Hemp, Dogsbane, Bindweed	Scout field in a zigzag pattern. Sample 10 random locations of 100 square feet. This is the width of two 30" rows, 20 feet long or one 30" row, 40 feet long. Whichever pattern best suits existing conditions. Map the location of these sampled areas and weeds.	Presence

Notes: The fruit or seeds of these weeds are contaminants in the raw and processed product. Select control measures to eradicate these perennials for the next cropping season. See "Postharvest Perennial Weed Control" for treatment options. Avoid planting lima beans in fields with severe infestations of weeds.

Weeds	Sampling	Threshold
Summer Annuals, Black Nightshade, Common Cocklebur, Jimsonweed, Morningglory	Scout as outlined above for the presence of existing weeds, especially the nightshades. Potential weed problems are best identified by a untreated weedy check. Identify the weeds, count number of each species. Note whether specific weeds are scattered throughout the field or predominate in one area of the field.	Presence

Notes: Untreated check provides most reliable information for planning the weed control strategy for the coming season. The presence of mature weeds in the fall will be indication of species needing control the following year.

Nightshades must be controlled because of the toxicity of their berries, a contaminant in the raw and processed product and the potential for staining the light skinned lima beans. Jimsonweed fruit are hallucinogenic. Common cocklebur is very competitive. Morningglory seed pods are a contaminant that is difficult to mechanically separate from harvested lima beans.

Pre-Planting Decisions: Use information obtained from past season's scouting to plan weed control program. Match preplant incorporated and preemergence herbicide rates to soil type and percent organic matter in each field.

Emergence to Third Trifoliate (three weeks after planting)

Weeds	How to Sample	When

Zero Tolerance Weeds: Nightshades, Horsenettle, Morningglory, Jimsonweed, Summer Annuals, Perennials	Scout field in zigzag pattern. Sample 10 random locations of 100 square feet. This is the width of two 30" rows, 20 feet long or one 30" row, 40 feet long. Whichever pattern best suits existing conditions. Map location of zero tolerance weeds. Determine whether weeds are predominantly within the row or between rows.	Once approximately 3 wks. after planting. Number of annual weeds/100 square feet • <1 weed: very light • 1-5 weeds: light • 5-20 weeds: medium • 20-50 weeds: heavy • >50 weeds: very heavy

Threshold	
# weeds/10 ft. row or 1 sq. yd.	**Action**
Zero Tolerance Weeds: Presence	Control required
Summer annuals: < 1.0 weed 1-5 weed > 5 weed	 None Control may be required Control required

Note: zero tolerance weed seeds or fruits are a contaminant in raw and processed product or are highly competitive. Nightshade species: berries toxic plus have the potential to stain light skinned lima beans. Jimsonweed fruit are hallucinogenic. Horsenettle berries and morningglory seed capsules are difficult to separate from harvested beans. Whether weeds are within the row or between the row determines if cultivation will be an effective control. Cultivate in a way that leaves the field as flat as possible to improve harvest recovery of limas.

Weeds	How to Sample	When	Threshold
All Weeds	Same as above.	1 week after control measures are implemented from the 3 week scouting.	This information is used to evaluate how well controls worked

Flowering Stage (five to six weeks after planting)

Weeds	Sampling	Frequency

Zero Tolerance Weeds: Horse-nettle, Black Nightshade, Morningglory, Jimsonweed, Summer Annuals, Perennials.	Scout field in a zigzag pattern. Sample 10 random locations of 100 square feet. This is the width of two 30" rows, 20 feet long or one 30" row, 40 feet long. Whichever pattern best suits existing conditions. Map location of zero tolerance weeds. Determine whether weeds are predominantly within the row or between rows.	Once 5- 6 weeks after planting

Threshold	
# weeds/10 ft. row or 1 sq. yd.	**Action**
Zero Tolerance Weeds: Presence	Control required.
Summer Annuals: < 0.25 weed 0.25 - 1 weed > 1 weed	 None Control may br required. Control required.

Size of weed is important in determining a threshold. Weeds less than 4 inches tall at this point in the season will have no impact on yield. Broadleaf weeds over 6-8 inches tall will probably not be adequately controlled with Basagram. Most grasses can be effectively controlled up to 8 inches tall. Cultivate if weeds are predominantly between the rows. Cultivate in a way that leaves the field as flat as possible to improve harvest recovery of limas.

Weeds	Sampling	Frequency	Threshold
Horsenettle, Black Nightshade, Morningglory, Jimsonweed	Scout as previously described. Map location of these weeds**.**	Once prior to harvest.	Presence

Notes: The fruits or seeds of these weeds are contaminants in the raw and processed product causing economically significant grade reductions. Nightshade berries are toxic and can cause staining of limas.

Weeds	Sampling	Frequency	Threshold
Perennial Weeds	Scout as previously described. Map location of these weeds.	Once prior to harvest.	Presence

Notes: This information is used to determine if a fall treatment is required to control perennial weeds.

Herbicide Program for Lima Beans (2)

Product and Rate -Preemergence

- **Dual 1.25-1.5 pts./A and Pursuit 2 to 3 oz./A**
  May be used preemergence or preplant incorporated. Preplant-incorporated treatments of Pursuit will persist longer in the soil, which must be taken into consideration with rotational crops. Dual provides excellent control of grasses and good control of nutsedge. Pursuit provides good control of many annual broadleaf weeds. It provides fair control of morningglories, common ragweed, or common lambsquarters. When using Pursuit, consider rotational crop restrictions.
- **Treflan 1 pt./A and Pursuit 2 to 3 oz./A**
  Treflan must be preplant-incorporated. Treflan gives excellent control of grasses, but has no activity on nutsedge. Pursuit may be applied preemergence or preplant incorporated. Preplant-incorporated treatments of Pursuit will persist longer in the soil. Pursuit provides good control of many annual broadleaf weeds. It provides fair control of morningglories, common ragweed, or common lambsquarters. Rotational crop restrictions must be considered with Pursuit.

Product and Rate-Postemergence

- **Basagran 1.5 to 2 pints/A**
  Used postemergence to control certain broadleaf weeds. Does not control pigweed, but will control cockelbur, mustards, jimsonweed, common lambsquarter, common ragweed, and morningglory. Will have some effect on Canada thistle. Temporary pronounced crop injury may occur. Use crop oil concentrate, or if temperatures above 90 degrees F, a non-ionic surfactant. Basagram is much more effective if used when the weeds are small (less than 2 inches tall).
- **Poast 1 to 1.5 pints/A**
  Will control annual grasses and certain perennial grasses. Use with crop oil concentrate at 1 percent solution (1 gallon/100 gallons of spray solution). For best results, treat when grasses are actively growing. Do not mix with Basagran or any other pesticide.

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[1] FOOTNOTES:
Penncap-M, a cancelled insecticide, was deleted from this profile for use on Mexican Bean Beetle, Potato leaf hopper, Stink Bug/ Lygus Bug and Corn Earworm. Listed herbicides and fungicides are currently labeled for lima bean.