# Chickpea Production Recommendations

## Field Selection and Seeding

For integrated disease management, start by selecting a field that has not had chickpea for at least three years and is at least three miles from previous year's fields. However, even with these precautions, any chickpea field should be considered susceptible to Ascochyta blight during wet periods since long distance spore transmission is possible. Fields that are well drained are preferred, as chickpea suffers plant injury from waterlogged soil relatively quickly compared with other non-legume broadleaf or cereal crops.

Chickpea is typically seeded in narrow row spacings of 6 to 12 inches. Target stand densities range from 3 plants per square foot for large kabuli types to 4 plants per square foot for desi and small kabuli types. This will typically require planting 4 seeds/sq.ft. for large kabuli and 5 seeds/sq.ft. for desi chickpea. Depending on seed size this often translates into seeding rates of 80-100 lb/a for desi types and 125-150 lb/a for large kabuli types. Seeding depth recommendations are 1 inch below moist soil for small-seeded types and 2 inches below moist soil for large-seeded types. Chickpea can be seeded to a depth of 4 inches to utilize available soil moisture for germination. (Adapted from NDSU Pub A-1236).

## Weed Management

Pages 36 and 37 of the 2018 North Dakota Weed Guide show the herbicides that available for use in chickpea production. Note there are no postemergence herbicides for broadleaf weed control in chickpea. Only grass herbicides (Assure II, Select, Poast) are registered for postemergence use. Thus, it is essential to apply soil-residual herbicides either preplant or preemergence to control broadleaf weeds.

It is also very important to match herbicide rates with soil characteristics. The herbicide rate needs to be based on soil texture, % organic matter, and soil pH. Historically, chickpea has shown excellent tolerance to most soil-applied herbicides. In Montana, MSU research has shown high injury potential with preemergence applications of Pursuit in chickpea. Postemergence grass herbicides need to be applied before flowering to avoid crop injury. Perennial weeds must be controlled with Glyphosate applied in the fall and preplant/preemergence. Soil-residual herbicides will not control perennial weeds.

Glyphosate, Gramoxone, Sharpen, and Valor are labeled for pre-harvest use as a harvest aid. Glyphosate and Sharpen should not be applied pre-harvest to chickpea grown for seed production because reduced germination and vigor may occur. Sharpen and Valor should be applied with Glyphosate for improved desiccation. Sharpen and Valor must be applied with an MSO adjuvant. Gramoxone typically will provide faster desiccation than Glyphosate, Sharpen, and Valor. For Gramoxone, expect to harvest no earlier than 7-10 days after application. For Glyphosate + Sharpen or Valor, expect to harvest no earlier than 10-14 days after application.

Desiccation is much faster with warmer temperatures. If temperatures are cool, desiccation will be much slower.

## Disease Management

Chickpeas are very susceptible to Pythium and Rhizoctonia root rots and can suffer significant reductions in plant establishment and significant reductions in crop vigor to these diseases. The seed treatment fungicide active ingredients mefenoxam, metalaxyl, and ethaboxam have efficacy against Pythium, and the combined use of mefenoxam or metalaxyl with ethaboxam is recommended where risk of Pythium is high. Mefenoxam, metalaxyl, and ethaboxam do not have efficacy against Rhizoctonia root rot and should be utilized in combination other seed treatment fungicides registered for use against Rhizoctonia.

The foliar disease Ascochyta blight can cause complete crop loss in chickpeas even on fields with no prior history of the disease. The disease is seed-borne and is transmitted from seeds to the emerging seedlings, and it is also introduced to new fields through atmospheric movement of spores. The causal pathogen produces infective spores on overwintered diseased chickpea residues, and the spores are carried aloft in the atmosphere and can move miles away from their original source.

The use of seed lots that test negative for seed-borne Ascochyta and seed treatment with fungicides that suppress the transmission of Ascochyta from seeds to seedlings reduce the risk of Ascochyta development from diseased seed but do not eliminate that risk. Seed testing for seed-borne Ascochyta is conducted on small samples of seed and can fail to detect low levels of seed-borne disease, and seed treatment fungicides reduce, but do not eliminate, seed-to-seedling transmission of the disease.

Ascochyta initially develops as a few small scattered disease lesions within the canopy during mid- to late vegetative growth or early bloom, often at low incidence. In very susceptible varieties such as ‘Sierra’ or ‘CDC Xena’, the disease can spread significantly even prior to bloom initiation when the canopy is completely open, and use of these varieties is not recommended in the Northern Plains. In more resistant varieties such as ‘CDC Frontier’ or ‘CDC Orion’, significant spread of disease generally does not occur until bloom when the canopy begins to close, trapping humidity. Ascochyta blight can be difficult to control once significant disease development has occurred, and a foliar fungicide application during early bloom is advised. Subsequent fungicide applications should be made at 10- to 14-day intervals as needed on the basis of rainfall patterns.

Fungicide efficacy:

- The pathogen causing Ascochyta blight has developed resistance to the QoI (FRAC 11) fungicides, and the fungicides Headline (pyraclostrobin), Quadris (azoxystrobin), and Aproach (picoxystrobin) have no efficacy against the disease.
- DMI (FRAC 3) fungicides differ in their effectiveness against Ascochyta blight. Proline (prothioconazole) is more effective than Quash (metconazole), and older DMI fungicides

such as propiconazole (sold in the premix product 'Quilt') have little or no efficacy against Ascochtya blight.

- SDHI (FRAC 7) fungicides have shown equivalent efficacy to Proline when disease pressure is low to moderate but are less effective than Proline when conditions are highly favorable for disease.
- Tank-mixing Proline or SDHI fungicides with chlorothalonil (Bravo WeatherStik, Echo 720, and other brands) improves Ascochyta disease control and can significantly improve chickpea yield and quality under disease pressure. Tank-mixing with chlorothalonil is advised for all fungicide applications, even those made after the canopy is closed. When tank-mixing, apply chlorothalonil at the low end of the labeled rate (generally 1.38 pt/ac) and maintain the full labeled rate of tank-mix partner.
- Two or more fungicide applications are often needed, and DMI (FRAC 3) and SDHI (FRAC 7) fungicides should be rotated in order to reduce the risk of the development of fungicide resistance.

## Soil fertility

Chickpeas, like other legumes have the ability to use rhizome bacteria that fix nitrogen. It's important to inoculate the crop with the bacteria *Mesorhizobium cicer*. This is not the same bacteria found in soybean, peas, or lentils. Excess soil nitrogen levels can reduce yields because of late or little nodulation. It is recommended that soil nitrate levels (including fertilizer application) does not exceed 60 lbs/ac at the 0-2 ft depth. Desi-type chickpeas require less phosphorus than Kabuli types. Chickpeas also have a low potassium demand. Table 1 shows fertilizer application rates based on soil tests. In sandy soils during wet years, 15 to 20 lbs of S/ac as ammonium sulfate has shown benefit. No evidence has been observed regarding other micronutrient's effects on chickpea yields. Like other pulse crops, chickpeas are not very salt tolerant. Soils having an electrical conductivity (E.C.) greater than 1.5 millimohs/cm should be avoided.

**Table 1.** Nutrient recommendations for Desi- and Kabuli-type chickpea. Adapted from Soil Fertility Recommendations for Field Pea, Lentil, and Chickpea in North Dakota SF725, D. Franzen, 2018).

| | Olsen phosphorus test (ppm) | | | | | Potassium soil test (ppm) | |
|---|---|---|---|---|---|---|---|
| Chickpea type | 0-3 | 4-7 | 8-11 | 12-15 | 16+ | <100 | >100 |
| | $P_2O_5$ rate to apply (lbs/ac) | | | | | $K_2O$ rate to apply (lbs/ac) | |
| Desi | 40 | 30 | 20 | 10 | 0 | 30 | 0 |
| Kabuli | 60 | 40 | 30 | 20 | 10 | 30 | 0 |

**Insect Management**

Wireworm: Wireworms damage crops by feeding on seedlings or the germinating seed. Damaged plants soon wilt and die, resulting in a thinner plant stand. During crop establishment, scout soil around damaged plants to identify wireworms feeding on the roots. Wireworms live below ground. An average of one to two larvae per bait station prior to planting justifies the use of an insecticide seed treatment or in-furrow soil insecticide at plant.

Cutworm: Larvae will cut young plants in the seedling to six- to eight-leaf stages. Cut plants can be found drying up and lying on the soil surface. As damage continues, fields may have areas of bare soil where plants have disappeared, causing reduced plant stands. Cutworms initially will feed on leaf tissue or around stems without cutting them. Cutworms emerge in April to early June and initially feed on weeds and volunteer crops. Field pea, lentil and chickpea: Economic threshold = two to three cutworm caterpillars per square yard. Insecticide management should occur in the evening.

Grasshoppers: Adults and nymphs are defoliators, feeding on green plant material and creating holes on leaves or pods later in the year. High-population (outbreak) seasons may result in yield loss and a delay in maturity due to delayed pod set. Monitor grasshopper populations from June through fall, especially following long, warm falls, or drought. Scout for grasshoppers in field edges and within the field. Chickpea Economic Threshold:

| Nymphs per square yard | | Adults per square yard | |
|---|---|---|---|
| Margin | Field | Margin | Field |
| 50-75 | 30-45 | 21-40 | 8-14 |