University of Idaho College of Agricultural and Life Sciences

CIS 826

Northern Idaho Fertilizer Guide

Chickpeas

by Robert L. Mahler

These fertilizer guidelines have been developed by the University of Idaho and Washington State University based on relationships between soil tests and yield responses for peas and lentils. The fertilizer rates suggested are designed to produce above-average yields if other factors are not limiting yields. This fertilizer guide assumes good management.

The suggested fertilizer rates will be accurate for your field provided (1) the soil sample was properly taken and is representative of the areas to be fertilized, and (2) the crop and fertilizer history supplied is complete and accurate. For additional information on how to collect and process a soil sample, see University of Idaho Bulletin 704, *Soil Sampling*.

Nitrogen

Chickpeas are legumes that are capable of acquiring a large portion of the nitrogen (N) they need from the atmosphere. This "N fixation" is accomplished by bacteria that form nodules on the roots of the chickpea plant. These bacteria (rhizobia) are different from the rhizobia that nodulate peas and lentils and are not normally found in northern Idaho soils. The inoculum specific to chickpeas should be used when (1) chickpeas have not been grown on a field within the last 2 years or (2) when the soil pH is less than 5.7. For additional information on inoculation and methods of inoculum application, see University of Idaho CIS 838, *Inoculation of Legumes in Idaho*.

Most chickpea seed is treated with captan. This fungicide is harmful to rhizobia, so inoculating chickpea seed with rhizobia requires special handling in one of three ways. One method is to place a granular inoculum in the seed row at planting. Several companies manufacture granular inocula. The application rate should be between 5 and 10 pounds of granular inoculum per acre depending on when chickpeas were last planted in the field. Another alternative is to add a peat-based inoculum to the drill box at twice the recommended rate just before planting (slurry method). The third option, possible in areas where water mold-type fungi (*Pythium* etc.) are the major pathogens, is to use metalaxyl as the fungicide instead of captan. Chickpea seed can be treated with a peat-based inoculum if metalaxyl is used.

Phosphorus

Phosphorus (P) should be incorporated into the seedbed before planting or applied at planting by whatever method is most convenient for the grower. P fertilizer can be surface-broadcast and plowed down or tilled into the soil. It can also be banded or drilled with the seed. Be careful not to allow direct contact between the seed and the fertilizer if the fertilizer material contains any N or potassium in addition to P.

Chickpeas are sensitive to excess salts (contained in N and potassium) during germination. If heavy applications are required to correct nutrient deficiencies, apply P before or during seedbed preparation. Phosphorus needs can be determined effectively with the aid of a soil test (Table 1).

Table 1. Phosphorus fertilizer rates for chickpeas based on a soil test.

Soil test P (0 to 12 inches)[1]			P_2O_5 application rate[2]	
NaOAc	Bray I	$NaHCO_3$	P_2O_5	P
(ppm)	(ppm)	(ppm)	(lb/acre)	(lb/acre)
0 to 2	0 to 20	0 to 8	60	26
2 to 3	20 to 30	8 to 10	40	18
3 to 4	30 to 40	10 to 14	20	9
over 4	over 40	over 14	0[3]	0

[1] Soil test P can be determined by three different procedures: sodium acetate (NaOAc), Bray I method, or sodium bicarbonate ($NAHCO_3$). Sodium bicarbonate should not be used on soils with pH values less than 6.2. Use the column indicated by your soil test report.

[2] P_2O_5 x 0.44 = P, or P x 2.29 = P_2O_5.

[3] Under reduced tillage, apply up to 20 lb P_2O_5 per acre on soils testing in excess of 4 ppm P (NaOAc soil test P).

Potassium

Soils in northern Idaho usually contain sufficient potassium (K) for chickpea production. If soils are deficient, K should be incorporated into the seedbed by whatever method is most convenient for the grower. K

fertilizer can be surface-broadcast and plowed down or tilled into the soil. It can also be banded or drilled with the seed.

Do not allow direct contact between the seed and the fertilizer because germinating chickpeas are sensitive to the salts in K fertilizers. If heavy applications are required to correct nutrient deficiencies, apply K before or during seedbed preparation. Potassium needs can be determined with the aid of a soil test (Table 2).

Table 2. Potasium fertilizer needs of chickpeas based on a soil test.

Soil test K (0 to 12 inches)[1]	K_2O application rate[2]
(ppm)	(lb/acre)
0 to 50	90
50 to 75	60
more than 75	0

[1] Sodium acetate-extractable K in the 0- to 12-inch depth.

[2] K_2O x 0.83 = K, or K x 1.20 = K_2O.

Sulfur

Adequate levels of sulfur (S) are necessary for maximum production of chickpeas. Without adequate S, chickpeas are not able to fix enough atmospheric N to meet the N needs of the plants. Avoid using granular elemental S applications on chickpeas because this form of S is only slowly available to the plant and greatly reduces soil pH. Sulfate forms of S fertilizers are readily available and do not acidify soils. Sulfur needs of chickpeas based on a soil test are shown in Table 3.

Table 3. Sulfur fertilizer needs of chickpeas based on a soil test.

Soil test S (0 to 12 inches)		S application rate
(ppm SO_4-S)	(ppm)	(lb/acre)
0 to 10	0 to 4	20
over 10	over 4	0

Boron

Chickpeas grown in northern Idaho may respond to boron (B) applications. Boron need can be determined by a soil test. Soils testing less than 0.5 ppm B should receive 1 pound of B per acre. Do not exceed the 1.0 pound per acre application rate. Boron can be toxic to chickpeas if application rates are excessive or if it is concentrated too close to the seedling.

Boron fertilizer should always be broadcast, never banded. For information on B and specific fertilizer materials, refer to University of Idaho CIS 1085, *Boron in Idaho*.

Molybdenum

Chickpeas grown in northern Idaho may respond to applications of molybdenum (Mo). Because Mo is present in only small amounts, a soil test for Mo is not commercially available. Consequently, Mo fertilizer recommendations are based on cropping history and soil pH.

Mo can be conveniently applied as a seed treatment at the recommended rate of 1 ounce per acre. If Mo fertilizer is applied directly to the soil, a rate of 1 pound ammonium molybdate or sodium molybdate per acre should be used when (1) the soil pH is less than 5.7, or (2) every third time a legume (chickpeas, peas, or lentils) is grown on a field. For more information refer to University of Idaho CIS 1087, *Molybdenum in Idaho*.

Other micronutrients

Chickpeas grown in northern Idaho would not be expected to respond to applications of chlorine (Cl), cobalt (Co), copper (Cu), iron (Fe), manganese (Mn), nickel (Ni), or zinc (Zn). Therefore, applications of these materials in northern Idaho are not needed.

Lime

Lime applications of 1 ton per acre for chickpeas should be considered on fields with pH values of 5.3 or less. Reduced chickpea yields may occur at soil pH 5.4 to 5.5. The yield response from liming may not be economical when soil pH is above 5.3, however. Low soil pH reduces the nitrogen fixation potential of chickpeas. For more information on lime materials, refer to University of Idaho CIS 787, *Liming Materials*.

Agronomy/Water quality considerations

- Weeds, insects, diseases, and environmental stress can influence the effectiveness of a fertilizer program and reduce yields.
- Chickpeas take up residual soil nitrate (nitrate not used by the preceding cereal crops) and therefore reduce the potential for N loss by leaching. Thus, checkpeas can have a positive impact on groundwater quality.
- Chickpeas are capable of fixing most of the nitrogen they need from the atmosphere. Fields in northern Idaho that have a history of chickpea production generally contain adequate amounts of the soil bacteria (rhizobia) that are responsible for this nitrogen-fixation process. Consequently, inoculation of checkpeas with rhizobia is necessary only in fields that do not have a history of chickpea production. The rhizobia that produce root nodules on checkpea roots are different from the rhizobia that produce root nodules on peas and lentils.
- Early planting of chickpea varieties is critical for maxiumum economic yields.
- Using chickpeas in a crop rotation can reduce disease and weed problems in grain crops.

- Spring-planted chickpeas have generally been planted in seedbeds having a minimum of straw residue on the soil surface. However, chickpeas grown under conservation tillage systems with moderate levels of surface residue typically produce similar or higher yields than chickpeas grown under low-residue, intensive tillage systems. The greatest yield benefits are in relatively dry years.
- To prevent soil compaction, avoid tillage at high soil moisture levels. Also avoid overworking the soil and creating a finely pulverized surface that is vulnerable to erosion and prone to sealing and crusting.
- Avoid planting in poorly drained areas.
- Starter, or pop-up, fertilizers have limited success on chickpeas. Starter fertilizers have been most effective when soils were cold and root growth could be stimulated by a readily available supply of P.
- Banding fertilizer improves P use efficiency. Consequently, if applying P, cut the recommended fertilizer application rates by 10 to 15 percent.
- If you need further information on cultural practices contact the extension educator in your county.

Further reading

CIS 787, *Liming Materials*, 50 cents
CIS 838, *Inoculation of Legumes in Idaho,* 35 cents
BUL 704, *Soil Sampling*, $2.00
CIS 1085, *Essential Plant Micronutrients: Boron in Idaho*, $3.00
CIS 1087, *Essential Plant and Animal Micronutrients: Molybdenum in Idaho*, $1.00

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Northern Idaho fertilizer guides are available online and may be downloaded from http://info.ag.uidaho.edu/catalog/catalog.html. Look under Fertilizers and Soils:

CIS 447, *Alfalfa*
CIS 453, *Winter Wheat*
CIS 785, *Winter Rapeseed*
CIS 788, *Bluegrass Seed*
CIS 815, *Blueberries, Raspberries, and Strawberries*
CIS 820, *Grass Seedings for Conservation Programs*
CIS 826, *Chickpeas*
CIS 851, *Legume and Legume-Grass Pastures*
CIS 853, *Grass Pastures*
CIS 911, *Northern Idaho Lawns*, also available in print for $1.00
CIS 920, *Spring Barley*
CIS 954, *Winter Barley*
CIS 1012, *Spring Canola*
CIS 1083, *Lentils*
CIS 1084, *Spring Peas*
CIS 1101, *Soft White Spring Wheat*

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