

● Seeding Practices for Michigan Crops

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HIGH QUALITY SEED is important in obtaining a desired plant population, high yield and high quality in the harvested crop. High quality seed means: high germination (usually above 90 percent); absence of noxious weed seed; and relative freedom from other crop seed, diseased seed, weed seeds, and inert matter. Seed of unknown variety or doubtful quality should never be planted. In addition, seed should be of uniform size for accurate planting, especially with standard planter plates. **CERTIFIED SEED** represents the most reliable source of high quality seed. Planting information presented here is based on the use of high quality seed. Seeding rates should be increased if substandard seed is planted (for emergency situations only).

Plant Population

Optimum plant population is essential for high yields. A very high population can result in excessive plant competition for water and nutrients, barrenness in corn, and lodging in soybeans. Below optimum population can result in incomplete use of water, nutrients, and light. This can lead to suckering (corn) and low branching (soybeans), which may result in lower yields.

Plant population or seeding rate is influenced by row width, crop species, soil and climatic variables, and sometimes use of the crop. Suggested planting rates, seeds per pound, and weight per bushel for various crops grown in Michigan are shown in Table 6.

Planting Rate for Row Crops

Planting rates for field seeds are customarily expressed in pounds or bushels per acre. However, with the large number of varieties (and hybrids) available and the great variation in seed size (grades), other methods of expressing planting rates may be more ap-

propriate. Seeds per foot of row is a better designation for soybeans (see Table 2), field beans (see Table 3) and grain sorghum. It is now common to use "inches between seeds" for hybrid corn (Table 1).

By using these designations, the same planting rate may be used for each variety, regardless of seed size or how the lot is screened or graded. To calculate total seed requirements, number of seeds per pound of the seed lot(s) to be planted must be known.

Planting Rate for Solid Seeded Crops

Seeding rates for forages and small grains (Table 6) are given in pounds or bushels per acre. The ranges listed account for variable planting conditions and seed size. There are fewer large-sized seeds in a bushel or pound than in an equal measure of smaller-sized seeds. Large-seeded varieties require a greater weight or volume seeding rate per acre for similar populations.

Under optimal climatic, soil, and fertility conditions and use of high quality seed (high germination and purity) the lower seeding rates listed can probably be used. Less than optimal conditions often require the higher rates.

Seeding methods also affect seeding rate. Band seedings with fertilization and use of press wheels give best results for establishment of forages. Planting rates for forages listed in Table 6 apply to band seeding. If broadcast seedings (less desirable method) are made, rates should be increased by 1.25 times the amount listed. When planting a grass with a legume the planting rate of the grass can vary to obtain more or less grass in the stand.

Small grains intended for use as silage or green chop should have seeding rates increased by 1.50 times the recommended rates for grain. If small grains are used as companion (nurse) crops with forages, the recommended seeding rate for the small grains should be reduced by one-fourth to one-third.

Table 1. Approximate number of seeds per acre at varying row widths and spacings in the row.

Seed Spacing in the row (in.)	Row width (in.)									
	7	14	20	24	28	30	32	36	38	40
1	896,000	448,000	314,000	261,000	224,000	209,000	196,000	174,000	165,000	157,000
1.5	598,000	299,000	209,000	174,000	149,000	139,000	131,000	116,100	110,000	104,000
2	448,000	224,000	155,000	131,000	112,000	104,000	98,000	87,100	82,500	78,400
3	298,000	149,300	104,000	87,100	74,800	69,700	65,400	58,000	55,000	52,300
4	224,000	112,000	78,400	65,300	56,000	52,200	49,000	43,500	41,300	39,200
5	179,000	89,600	62,700	52,300	44,900	41,800	39,200	34,800	33,000	31,400
6	149,000	74,700	52,400	43,600	37,300	34,800	32,700	29,000	27,500	26,100
7	217,000	63,500	44,400	37,000	31,700	29,600	27,800	24,700	23,400	22,200
8	112,000	56,000	39,100	32,700	28,000	26,100	24,500	21,800	20,600	19,600
9	99,300	49,700	34,800	29,000	24,800	23,100	21,700	19,300	18,300	17,400
10	89,600	44,800	31,400	26,100	22,400	20,900	19,600	17,400	16,500	15,700
11	81,400	40,700	28,500	23,700	20,400	19,000	17,800	15,800	15,000	14,300
12	74,700	37,300	26,100	21,800	18,700	17,400	16,300	14,500	13,800	13,100

Table 2. Suggested Planting rates for soybeans in rows.*

Row width (in.)	Seeds/ft. of row**	Approx. lbs/acre***
28-30	7-9	45-60
18-20	6-8	50-70
14-16	4-5	60-80
7-10	2.5-4	70-100

*Based on 90% germination and allows for one rotary hoeing and good standability.

**Use the higher number of the range for the wider row width.

***Pounds per acre will vary with the variety because of differences in seed size. Low rates for small seeded varieties, high rates for large-seeded varieties.

Table 3. Suggested planting rates for field beans.

Type	Row width (in.)	Seeds/ft. of row	Approx. lbs/acre
Navy	28	4 to 5	40
Cranberry	28-32	3 to 4	60
Kidney	28-32	3 to 4	60
Yelloweye	28-32	4	60
Pinto	28	4	50
Black turtle	28	4 to 5	40

Table 4. Suggested corn plant populations.*

Yield Goal (bu./acre)	Plants/Acre †
70-80	14,000-16,000
90-120	18,000-19,000
130-200	20,000-23,000

(In southern Michigan, if corn is planted by May 1, use a seed population 15 to 20 percent higher than the desired population. For May 1-20 planting use 10-15 percent more seed than desired plants. After May 20 use 10 percent more seed.)

*May desire higher rates under irrigation.

Table 5. Approximate numbers of seed per unit in good quality bean seed.

Type	seeds/lb.	seeds/cwt or bu.
Navy bean	2,200	220,000/cwt
Cranberry bean	900	90,000/cwt
Red kidney bean	800	80,000/cwt
Black turtle bean	2,200	200,000/cwt
Pinto bean	1,200	120,000/cwt
Yelloweye bean	950	95,000/cwt
Soybean, small size seed	3,000	180,000/bu
Soybean, medium size seed	2,600	156,000/bu
Soybean, large size seed	2,200	132,000/bu

Calculating Seed Requirements for Desired Stands

Row crops, especially corn, are typically overplanted to compensate for seed and seedling mortality. Under average conditions of moisture and temperature, 10 to 15 percent seed and seedling mortality may be expected even with high quality seed. On organic soils, or with very early planting on mineral soils, seedling losses may reach 20 percent. These principles of adjusting planting rates can also be applied to other row crops.

For hybrid corn a grower may want final population of 20,000 plants per acre in 30-inch rows. Allowing about 15 percent extra seed to account for seed and seedling mortality, the seed requirement is 23,000 seeds per acre (115% times 20,000). In Table 1, under the 30-inch row spacing, the closest number of kernels to

23,000 is 23,100. This occurs when seed is spaced 9 inches apart in 30-inch rows. Seeds with 1,600 kernels per pound, 1 bushel (56 pounds) will contain 89,600 kernels (1,600 times 56) and will plant 3.9 acres (89,600 divided by 23,100).

Another method of calculating seed requirements without the use of Table 1 is as follows: Assume you want to plant 50 acres of a large-seeded soybean variety in 30-inch rows at the rate of 10 seeds per foot of row. Imagine, then, that you have a "long acre," that is, one row, 30" wide. Such a row would need to be 17,424 feet long (43,560 sq. ft. per acre divided by 2.5 ft.) for an acre. With 10 beans per foot of this "long row," 174,240 seeds per acre would be needed. According to Table 5, the number of seeds per pound of a large seeded variety is 2,200. For 50 acres: Multiply 174,240 times 50 and divide by 2,200. Seed required = 3,955 pounds or 66 bushels.

Planting Speed Affects Plant Stand

Seed spacing in the row is affected by planting speed. For many corn planters, a speed of 3 to 4 miles per hour is optimum. At high speeds, uniform spacing of seeds is reduced and there is a tendency toward skipping and bunching. Newer planters are more accurate at higher speeds. Use of planter plates with more cells per plate will improve planting accuracy at higher speeds. Plateless planters may also allow higher speed without sacrificing planting accuracy. Under any conditions, a check should be made to determine spacing accuracy and number of seeds per acre or foot of row, as well as planting depth and fertilizer placement.

Planting Depth

Suggested planting depths for the various crops are listed in Table 6. Planting depth is affected by soil texture, moisture, and temperature. Crops planted in dry coarse textured (sandy) soils may require deeper planting. Soils that are cold, of fine texture (clay) and/or are wet may require shallower planting. Special mention of planting depth of forage crops is needed. Seed of these crops are typically very small and can emerge only from shallow depth (less than 1") therefore, extreme care should be taken with regards to planting depth.

Planting Date

Date of planting is given in Table 6 for the various crops. Planting date varies each year because of weather differences, however; as we move north the calendar date of planting normally becomes later with spring-seeded crops and earlier with fall-seeded crops. The Great Lakes do affect temperatures and planting dates for areas near them.

Remember, EARLY spring planting usually results in higher yields.

Additional Information

Information on variety selection and the growing of a particular crop can be found in greater detail in other Cooperative Extension Service publications. Contact your local County Extension Service Office.

Table 6. Weight per bushel, seeds per pound and seeding rate, depth, and date for Michigan crops.

Crop	Weight per bushel (lbs.)	No. seeds* per lb.	Seeding rate per acre (lbs.)	Planting depth (in.)	Planting dates	Remarks
FORAGE LEGUMES						
Alfalfa	60	220,000	8-16 alone or with a grass	¼-½	With oats or barley in Apr.-May or alone in Apr.-early June or late July-mid Aug.	Seeding alone with herbicides in spring preferred if small grain is not needed or stands with small grains have not been satisfactory.
Red and Mammoth Clover	60	260,000	8-12 alone or with grass	¼-½	With small grains or alone in spring.	May be broadcast-seeded on honeycombed soil in a winter small grain (mid Feb.-Mar.) at slightly higher seeding rate.

Table 6 (continued).

Crop	Weight per bushel (lbs.)	No. seeds* per lb.	Seeding rate per acre (lbs.)	Planting depth (in.)	Planting dates	Remarks
ANNUAL GRASSES FOR FORAGE, PASTURE, GREENCHOP, TURF AND COVER CROP						
Sorghum-sudan-grass hybrid	—	15,000-20,000	30	1	May 1-June 15	Greenchop or pasture. Plant solid.
Sudangrass	40	55,000	20-25	1	May 1-June 15	Summer pasture.
Sorghum (forage)	50	15,000-20,000	7-9	1	May 10-June 10	Plant in rows, similar to corn. Cut once for silage.
Rape	50	157,000	4-6	1	April-June	Sheep pasture.
Millet (forage)	50	220,000	20-30	½-1	May 1-June 20	Japanese millet (U.P.) Green chop. Plant solid.
Ryegrass domestic	24	250,000	10	½	Last cultivation of corn. Aug. 15-Sept. 15 for turf.	As cover crop or improved types available for lawns. 2-5 lbs. per 1,000 sq. ft.
CASH AND FEED CROPS						
Corn (field)	56	1,300-2,200	10-16 (18,400-26,400 kernels/acre)	1½-2½	April 25-May 25	Seeding rate per acre depends upon seed grade, soil productivity and time of planting.
Corn (pop)	56	3,000-4,000	3-5	1-2	May 5-June 1	Seeds per pound depends on type.
Soybeans	60	2,000-3,000	45-80 in rows with 3,000-2,000 seeds/lb respectively	1½-2	May 5-June 5	Plant in rows. If planted solid use 70-100 lbs. seed per acre.
Field beans (navy)	60	2,200-2,400	30-40	2	May 25-June 15 Preferably June 1-5	See Table 3 detailed seeding rates.
Field beans (black turtle)	60	2,200	40	2	June 1-15	See Table 3 detailed seeding rates.
Field beans (pinto)	60	1,200	60	2	June 1-15	See Table 3 detailed seeding rates.
Field beans (kidney)	60	800-900	60-80	2	June 1-15	See Table 3 detailed seeding rates.
Field beans (cranberry and yelloweye)	60	850-1,000	60	2	June 1-15	See Table 3 detailed seeding rates.
Wheat (spring)	60	12,000	90	1-2	Soon as possible in spring	Not suitable for milling purposes.
Wheat (winter)	60	12,000	90-120	1-2	Sept. 13-Oct. 20	Plant after fly-free date plus 10 days.
Sugar beets		31,000-57,000	½-1¼	¾-1¼	April 10-May 15	Space seed 5-8" in rows.
Potatoes	60		17-20 cwt/acre	3-4	May 1-June 1	Use 1¼ oz. seed piece. Space 8-10" apart (except Russet Burbank and Norchip which should be 10-12") in 34" rows.

CORRECTION SHEET

E-489, Seeding Practices for Michigan Crops

(Note: This section on "Forage Legumes" and Perennial Grasses . . ." was left out of Table 6 and should be inserted after the copy on the third page.)

TABLE 6, Continued.

Crop	Weight per bushel (lbs.)	No. seeds* per lb.	Seeding rate per acre (lbs.)	Planting depth (inches)	Planting date	Remarks
FORAGE LEGUMES, Cont.						
Birdsfoot Trefoil	60	370,000	5-6 alone or with grass	¼-½	Preferably in Apr.-May with herbicides or with oats or barley in spring or alone in mid July-early Aug.	Use double amount of inoculant. Remove small grain early as silage, hay or pasture.
Ladino Clover	60	860,000	1-2 alone	¼-½	With small grains in spring.	Use ½ lb/acre of seed in alfalfa-brome mixtures.
Sweet Clover	60	250,000	12-15 alone	¼-½	With small grains in spring.	Same as Red Clover; Used primarily as a green manure crop.
Alsike Clover	60	680,000	3-5 in grass mixture	¼-½	With small grains in spring.	Use in lowland pasture mixtures.
Crownvetch	60	140,000	8-12	¼-½	Apr.-mid May alone with herbicides.	Pennngft, Chemung, Emerald are available varieties. Scarify seed. No companion crop.
PERENNIAL GRASSES FOR FORAGE, PASTURE, GREENCHOP, TURF AND COVER CROP						
Smooth Bromegrass	14	135,000	3-5 in legume mixture 12-15 alone	¼-1	Fall or spring.	Normally seeded with alfalfa or on mucks dry enough for corn.
Orchard	14	590,000	10-12 alone 4-6 in legume mixture	¼-½	Fall or spring.	Normally seeded with alfalfa or on mucks drier than for reed canarygrass. Use late maturing varieties.
Timothy	45	1,230,000	2-4 in legume mixture; 8 alone	¼-½	Fall or spring with small grains.	Normally seeded with alfalfa, red clover and birdsfoot trefoil.
Reed Canary grass	44-48	550,000	4-6 alone	¼-½	Aug. 1-20	On wet soils — especially on very wet muck soils.
Kentucky bluegrass	14-28	2,200,000	15-25	¼-½	Aug. 15-Sept. 15 Early spring or dormant fall planting.	August planting preferred. For turf use 1 lb. per 1,000 sq. feet.
Fescue, Tall	—	225,000		¼-½	Aug. 15-Sept. 15 Early spring or dormant winter planting.	Use only for coarse turf, playgrounds, etc. 2-4 lbs. per 1,000 sq. foot.
Fescue, Red	15-40	545,000	15-30	¼-½	Aug. 15-Sept. 15 Early spring or dormant winter planting.	Will tolerate shaded conditions. Use for spring cover crop or turf. For turf, use 1-2 lbs/1000 sq. ft.
Redtop	14	5,000,000	2-3 in mixtures	¼-½	Fall or spring.	Normally not used — adapted to moist soils in mixtures.

Table 6 (continued).

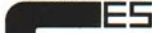
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Sorghum-sudan-grass hybrid	—	15,000-30 20,000	30	1	May 1-June 15	Greenchop or pasture. Plant solid.
Sudangrass	40	55,000	20-25	1	May 1-June 15	Summer pasture.
Sorghum (forage)	50	15,000-20,000	7-9	1	May 10-June 10	Plant in rows, similar to corn. Cut once for silage.
Rape	50	157,000	4-6	1	April-June	Sheep pasture.
Millet (forage)	50	220,000	20-30	½-1	May 1-June 20	Japanese millet (U.P.) Green chop. Plant solid.
Ryegrass domestic	24	250,000	10	½	Last cultivation of corn. Aug. 15-Sept. 15 for turf.	As cover crop or improved types available for lawns. 2-5 lbs. per 1,000 sq. ft.
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Soybeans	60	2,000-3,000	45-80 in rows with 3,000-2,000 seeds/lb respectively	1½-2	May 5-June 5	Plant in rows. If planted solid use 70-100 lbs. seed per acre.
Field beans (navy)	60	2,200-2,400	30-40	2	May 25-June 15 Preferably June 1-5	See Table 3 detailed seeding rates.
Field beans (black turtle soup)	60	2,200	40	2	June 1-15	See Table 3 detailed seeding rates.
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Field beans (kidney)	60	800-900	60-80	2	June 1-15	See Table 3 detailed seeding rates.
Field beans (cranberry and yelloweye)	60	850-1,000	60	2	June 1-15	See Table 3 detailed seeding rates.
Wheat (spring)	60	12,000	90	1-2	Soon as possible in spring	Not suitable for milling purposes.
Wheat (winter)	60	12,000	90-120	1-2	Sept. 13-Oct. 20	Plant after fly-free date plus 10 days.
Sugar beets		31,000-57,000	½-1¼	¾-1¼	April 10-May 15	Space seed 5-8" in rows.
Potatoes	60		17-20 cwt/acre	3-4	May 1-June 1	Use 1¼ oz. seed piece. Space 8-10" apart (except Russet Burbank and Norchip which should be 10-12") in 34" rows.

Table 6 (continued).

Crop	Weight per bushel (lbs.)	No. seeds* per lb.	Seeding rate per acre (lbs.)	Planting depth (in.)	Planting dates	Remarks
Oats	32	13,000	64-80	1-2	Soon as possible in spring-May 1	
Barley (spring)	48	13,000	96	1-2	Soon as possible in spring-May 1	
Barley (winter)	48	13,000	96-120	1-2	Sept. 10-30	
Rye	56	18,000	84-112	1-2	Sept. 1-Oct. 20	May be planted earlier for green manure or for winter cover in corn (in August).
Sorghum (grain)	56	15,000-20,000	4-6 (6-8 plants/ft. in 30" rows)	1-2	May 15-June 10	Plant in rows.
Sunflower	24-30	3,000-9,000	3-7 (16,500-23,000 seeds/acre)	1-2	May 1-25	
Buckwheat	48	20,000	45-60	1-2	June-early July	For grain and summer green manure.
Millet, pearl	56	85,000	10-15	½-1	May 15-June 15	
Millet (grain)	50	80,000	10-15	½-1	June 1-30	Emergency crop.
Vetch	60	21,000	15-20	1-2	Sept. 10-Nov. 1	Seed in combination with rye.
Spelt	30-40		50-100	1-2	Sept. 10-Oct. 10	
Triticales	45-50		50	1-2	Sept. 10-Oct. 15 or Apr. 1-30 if spring type	No seed available, at present, of varieties adapted to Michigan.
MIXTURES						
Oats and peas			2-3 bu.	1-2	April	Mix oats and peas in equal amounts.
Ryegrass and sweet clover			10-ryegrass 10-sw. clover	½	Last cultivation of corn	Cover crop.

*The above estimates should serve only as a guide. To be accurate, calculate the number of seeds in the lot to be planted. Weigh out an ounce of seed, count the number of seeds, and multiply by 16 to obtain seeds per pound. Another method is to weigh out ¼ pound of seed, count the seeds and multiply by 4 to get seeds per pound. Bushels can be obtained by dividing by the number of pounds in a bushel for any particular crop.

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