3.3 Planting Management (L. Delanoy, C. Schaupmeyer, D. Ziprick, A. Sullivan)

3.3.1 Adjusting Management According to Physiological Age of the Seed.

This chapter will be included in future manual updates.

3.3.2 In-row Seed Spacing

Potato growers on the Canadian Prairies plant potato seed pieces from 6 to 18" (15-46 cm) apart in the row. The following factors influence spacing. A brief explanation of how these factors influence in-row spacing follows:

- Variety – Different cultivars have different tuber sets and canopy development, therefore they require different in-row spacings. New producers should consult with their processor, field consultant or packer regarding spacing for a specific variety.
- Market – Seed and gourmet markets demand smaller tubers than fresh and processing markets. Smaller daughter tubers are obtained by planting seed at a closer in-row spacing, which increases competition between plants resulting in smaller daughter tubers.
- Moisture – Although difficult to predict, soil moisture status influences in-row seed spacing. Seed is planted closer under irrigated than rain-fed conditions, because the soil moisture required to support a high population of plants can be guaranteed.
- Planting date – Delayed planting shortens the growing season and in-row seed spacing may be increased to reduce competition between plants and promote tuber bulking.
- Seed size – Large seed pieces or large whole seed tubers can be spaced farther apart because they tend to produce more stems and set more tubers.
- Seed age – Physiological age is affected by field and storage conditions (stresses) during the previous growing season. To date, there is no objective method for determining physiological age. "Physiologically young" seed tubers can be planted closer together because they tend to produce fewer stems and set fewer tubers.
- Cost of Production – Close in-row spacing requires large quantities of seed. Some producers are reluctant to increase planting rates and plant at less than optimal spacing.

The following three tables (Tables 3.3-1, 3.3-2 and 3.3-3) show in-row spacing commonly used in Manitoba, Saskatchewan and Alberta.

Table 3.3-1 Commonly used in-row spacing in Manitoba.

In-row Spacing - Manitoba						
	Irrigated			Rainfed		
Variety	Seed	Table	Processing	Seed	Table	Processing
Atlantic			10-12", 25-31 cm	10-12", 25-31 cm		12-14", 31-36 cm
Conestoga			10-12", 25-31 cm	10-12", 25-31 cm		12-14", 31-36 cm
Dakota Rose		10", 25 cm		9-10", 23-25 cm	12", 31 cm	
Dakota Pearl			11", 28 cm			
Goldrush		10", 25 cm		10", 25 cm	12", 31 cm	
Morning Gold		10", 25 cm				
Norland		11-12", 28-31 cm		11-13", 28-33 cm	12-13", 31-33 cm	
Nordonna		12", 31 cm				
NorValley			10", 25 cm			12", 31 cm
Penta		11-12", 28-31 cm				
Pontiac		9-10", 23-25 cm		9-10", 23-25 cm	9-10", 23-25 cm	
Ranger Russet	10-12", 25-31 cm		12-15", 31-38 cm			
Russet Burbank	10-11", 25-28 cm	12-15", 31-38cm	12-18", 31-41 cm	12", 31 cm	15-16", 38-41 cm	17-18", 43-46 cm
Russet Norkotah		11-12", 28-31 cm				
Sangre		10-12", 25-31 cm		10-12", 25-31 cm	12-14", 31-36 cm	
Snowden			12", 31 cm			
Shepody	7-9", 18-23 cm		11-14", 28-36 cm	9-10", 23-25 cm		14-16", 36-41 cm
Viking		8-10", 20-25 cm		8-10", 20-25 cm	9-11", 23-28 cm	
Yukon Gold		8-9", 20-23 cm			9-10", 23-25 cm	

Table 3.3-2 Commonly used in-row spacing in Saskatchewan.

In-row Spacing - Saskatchewan				
	Irrigated		Rainfed	
Variety	Seed	Table	Seed	Table
Alpha	6-8", 15-20 cm		8-10", 20-25 cm	
Atlantic	6-8", 15-20 cm		8-10", 20-25 cm	
Cal White	6-8", 15-20 cm		8-10", 20-25 cm	
Norland	6-8", 15-20 cm	8", 20 cm	9-11", 23-28 cm	10", 25 cm
Ranger Russet	7-9", 18-23 cm		9-11", 23-28 cm	
Russet Burbank	7-9", 18-23 cm		9-11", 23-28 cm	
Russet Norkotah	6-8", 15-20 cm	8", 20 cm	7-9", 18-23 cm	10", 25 cm
Sangre	6-8", 15-20 cm	8", 20 cm	7-9", 18-23 cm	8", 20 cm
Shepody	6-8", 15-20 cm		7-9", 18-23 cm	
Yukon Gold	6-8", 15-20 cm	8", 20 cm	7-9", 18-23 cm	10", 25 cm

Table 3.3-3 Commonly used in-row spacing in Alberta.

In-row Spacing - Alberta					
	Irrigated			Rainfed	
Variety	Seed	Table	Processing	Seed	Table
Atlantic	6", 15 cm		8-9", 20-23 cm	6-10", 15-25 cm	
Alpha	6", 15 cm			6-10", 15-25 cm	
Bintje	6", 15 cm	8-10", 20-25 cm		6-10", 15-25 cm	10-12", 25-31 cm
Norland	6", 15 cm	8-10", 20-25 cm		6-10", 15-25 cm	8-11", 20-28 cm
Ranger Russet	6-7", 15-18 cm	11-12", 28-31 cm	11-12", 28-31 cm	6-10", 15-25 cm	12-14", 31-36 cm
Russet Burbank	6-7", 15-18 cm	11-13", 28-33 cm	11-13", 28-33 cm	6-10", 15-25 cm	12-14", 31-36 cm
Russet Norkotah	6", 15 cm	10-11", 25-28 cm		6-10", 15-25 cm	12-14", 31-36 cm
Shepody	6", 15 cm		10-11", 25-28 cm	6-10", 15-25 cm	
Umatilla	6", 15 cm		11-13", 28-33 cm	6-10", 15-25 cm	
Yukon Gold	6", 15 cm	9-11", 23-28 cm		6-10", 15-25 cm	10-12", 25-31 cm

3.3.3 Planting For Better Stand, Yield and Quality

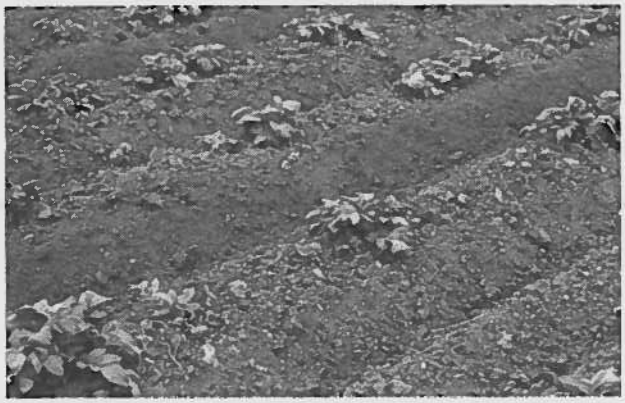
Potato fields that have been planted properly will produce complete stands of uniform plants (Figures 3.3-1). With adequate mid-season management, they will produce high yielding, top quality, and profitable crops.

Figure 3.3-1 Good plant stand (Courtesy of Clive Schaupmeyer)

Plant misses (Figure 3.3-2) result from seed decay, planter skips or blind seed pieces. A plant adjacent to a "miss" produces higher than average yield. However, the increase is not sufficient to compensate for the zero yield of the missing plant. Plants adjacent to misses generally produce oversize tubers that bruise more easily and are more subject to hollow heart, knobs and deformities.

Production costs for a field with a poor stand of variable plants are the same as those for a field with a high stand of productive plants.

Figure 3.3-2 Poor plant stand (Courtesy of Clive Schaupmeyer)



Soil Temperature at Planting

Planting into soil of the proper temperature is important to ensure a healthy stand of potatoes, especially when planting fresh cut seed. Wound healing of fresh cut seed takes place when soil temperatures are between 55-60°F (13-16°C). This temperature also encourages quick emergence without promoting the growth of seed piece decay organisms. Planting unhealed seed pieces in cold soils delays emergence and increases the risk of seed piece decay resulting in a poor plant stand.

Planter Operation

There are four types of planter mechanisms used in large-scale planters: pick (Figure 3.3-3), cup (Figure 3.3-4), belt and vacuum cup (Figure 3.3-5).

Figure 3.3-3 Pick planter mechanisms (Courtesy of Clive Schaupmeyer)

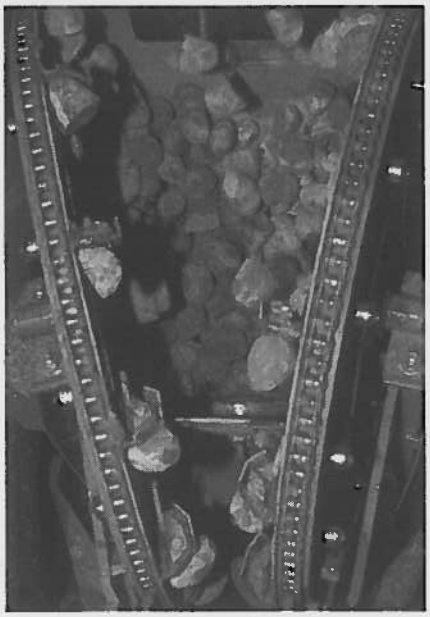


Figure 3.3-4 Cup planter mechanisms (Courtesy of Leonard Rossnagel)

Figure 3.3-5 Vacuum cup planter mechanisms (Courtesy of Clive Schaupmeyer)

A planter must be maintained in good working order. Planter models have different maintenance and adjustment needs and growers should seek adjustment and operating advice from manufacturers, machinery dealers or agronomy consultants.

The following are important to planter operation:

- To assure planter accuracy and to avoid misses, optimum ground speed must be determined for every seed lot
- For most pick and cup planters, the optimum speed is between 2.5 and 3.5 mph (4-5.6 km/h)
- Ground speeds may be slightly faster if in-row spacing are wider
- Vacuum planters generally plant well at higher speeds, up to 4 mph (6.4 km/h)
- Proper seed cutting. Irregular seed piece sizes affect planter performance. Planter accuracy is increased when seed piece size is uniform
- Picker (seed) bowls should normally have 5 to 10 lbs (2.25-4.5 kg) of seed in them at all times
- Cup planters may require matching cup size to average seed size

Planter Maintenance

Planters must be maintained according to the manufacturer's guidelines. Full details cannot be provided here, however primary concerns include:

- Pick planter springs must be replaced when weakened
- Dull picks must be replaced when planting accuracy declines
- Vacuum planter suction cups and air systems must be cleaned

Planter Calibration

Planters should be calibrated for each seed lot by planting seed for a short distance and then checking for misses and accuracy of spacing. Seed pieces are exposed by raking hills away from at least 20 feet (6 m) of row (Figure 3.3-6). Planter mechanisms can vary from row to row in a multiple row planter; therefore, all rows must be checked for accuracy.

Assess planter performance by measuring the spacing between seed pieces and counting the number of misses and doubles. As a general rule, at least 80% of the seed pieces should be within 2" (5 cm) of the narrow in-row spacing and 3" (7.6 cm) for wider in-row spacing. For example, if the target spacing is 12" (30 cm), the spacing between seed pieces should range from 10 to 14" (25-36 cm), while for a target spacing of 18" (45.7 cm), the range should be 15-21" (38-53 cm). Doubles and misses should be minimal. The plant population should be above 91%, and skips no greater than 5%. If spacing is inaccurate, and doubles and misses excessive, then planter speed should be changed and planter performance retested.

Figure 3.3-6 Calibrating the planter – Evaluating seed spacing (Courtesy of Clive Schaupmeyer)

Planting Depth

On the prairies, most producers plant seed pieces from 4 to 7" (10-18 cm) below the peak of the planter hill. Plants from seed pieces planted close to the surface will emerge earlier. However, soil temperatures near the surface may be too high for maximum tuber set. Shallow planting will cause the tubers to set high in the hill, increasing the risk of tuber greening and frost. Depending on soil moisture and temperatures, seed pieces that are planted too deep may have a higher incidence of decay. Planting into cold soil can increase the incidence of *Rhizoctonia* canker on stems and stolons resulting in poor emergence and low tuber set.