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Influence of Mulches on Crop Establishment and Yield of Direct Seeded and Transplanted Pumpkins

Pumpkins are a high value warm season crop which should respond well to the benefits supplied by soil mulches. Pumpkins can be established by either direct seeding or via transplanting. Direct seeding represents a lower cost option however, soil temperatures in the spring are rarely near the optimum for germination of pumpkins. Soil mulches should enhance germination of pumpkins as they increase soil temperatures. Higher soil temperatures under mulches should also accelerate crop development, increase yields and/or accelerate crop maturity. The benefits of mulch should be most apparent when slow developing cultivars are grown or when growing conditions are less than ideal.

In 1997 and 1998, the influence of **mulches** on two cultivars of pumpkin established from **seeds or transplants** was evaluated at the Plant Science Department Research Station in Saskatoon. The cultivars tested were;

“**Spirit**” -a relatively early maturing cultivar which produces excellent yields of medium sized fruit.

“**Howden**” - a later maturing cultivar which produces large fruit with excellent color

The mulch treatments were; **a) bare ground, b) black plastic mulch and c) clear plastic mulch.**

The crop was established in late May by either direct seeding through the mulch or by transplanting 10 day old seedlings. Plants were spaced 50 cm apart within each row. The mulch was applied about one week prior to crop establishment to allow for some soil warming. In the direct seeded treatment, a minimum of two seeds were placed in each planting hole. The crop was thinned to one seed/hole at three weeks after emergence. The crop was protected with a floating row cover until early June. Drip irrigation was used to supply water and nutrients to the crop. The fruit were collected in a once-over harvest in early October. Fruit were counted, weighed and evaluated for maturity based on degreening. Each treatment was replicated four times and each 5m long plot contained 10 plants.

Results

Both growing seasons were warmer than normal, with accumulated growing degree days (base 10C) over the production season 33% and 17% greater than normal in 1997 and 1998 respectively. In 1997, the first killing frost was 4 weeks later than normal. In 1998, April and May were exceptionally warm resulting in substantial soil warming prior to planting.

Plant stands for both cultivars were more complete in 1998 than in 1997 (Table 1). The exceptionally early spring in 1998 produced conditions better suited to establishment of pumpkins than in 1997. Both crop establishment methods produced excellent stands. Transplanting may have been more advantageous if conditions prior to and after seeding had been less favorable. For both cultivars, **establishing the crop on plastic mulch improved the stand relative the non-mulched control** (Table 1). Mulches conserve soil moisture and raise

soil temperatures; changes beneficial to establishment of both the direct seeded and transplanted crops. For cv. Howden, the clear plastic mulch produced a better stand than the black plastic. Howden had a much lower germination rate than cv. Spirit even under the greenhouse conditions used to establish the transplants. Germination of cv. Howden may be sensitive to unfavorable environmental conditions and might benefit from the warmer soil temperatures provided by the clear mulch.

The transplanted crop out-yielded the direct seeded crop in both cultivars. Since both establishment methods produced comparable stands, the yield difference must have been linked to the transplants enhancing canopy growth and/or fruiting. For cv Spirit, the **clear plastic mulch** produced yields substantially greater than either black plastic or the non-mulched control. For cv. Howden, both **mulches improved yields relative to the control.** The benefits of mulching were likely related to enhancement of soil temperatures. Clear plastic is more effective for soil warming than black, but this difference only appeared to benefit yields for cv. Spirit.

Complete degreening of pumpkins is crucial to successful marketing. For cv. Spirit, a greater proportion of the crop had matured to orange prior to harvest in 1998 than in 1997 (Table 1). This was unexpected, as 1997 was warmer than 1998 and had a long frost-free fall; both these factors should have been conducive to fruit ripening.

Relatively few of the slow growing cv. Howden, fruit were mature by harvest time irrespective of the year (Table 1). **Transplanting and mulching did not significantly enhance the maturity of either cultivar.** By substantially increasing the fruit load on each plant, these management practices may have retarded the rate of development of each fruit, thereby effectively canceling out the expected advancement in maturity.

In summary, maximum yields of pumpkins were obtained when the crop was grown on plastic mulches using transplants as a means for crop establishment. Production or purchase of transplants and laying of mulch both represent added production costs; growers need to examine the relative costs versus benefits before adopting these more intensive management practices.

Table 1. Main Effect Means for cv. Spirit and Howden Pumpkins Grown Using Two Crop Establishment Methods on Various Mulches in 1997 and 1998.

	Stand (%)	Yield		Avg. Fruit Weight (kg)	Mature (%)
		Kg/m plot	#/m		
SPIRIT					
<i>Year</i>					
1997	78	29.3	4.2	6.8	63
1998	94	41.2	5.4	7.5	84
LSD (0.10)	7	4.0	0.4	0.5	6
<i>Mulch</i>					
No mulch	80	32.9	7.4	7.0	72
Black	88	32.2	4.4	7.2	75
Clear	92	40.1	5.4	7.5	73
LSD (0.10)	8	4.9	0.5	0.6	8
<i>Establishment Method</i>					
Direct seed	88	33.3	4.4	7.1	70
Transplant	85	37.4	5.0	7.3	76
LSD (0.10)	7	4.0	0.4	0.5	7
HOWDEN					
<i>Year</i>					
1997	82	24.4	3.0	8.3	46
1998	91	38.2	4.0	9.6	39
LSD (0.10)	5	4.2	0.4	0.8	7
<i>Mulch</i>					
No mulch	82	29.8	3.1	9.5	42
Black	86	31.4	3.6	8.5	45
Clear	92	32.6	3.8	8.8	42
LSD (0.10)	6	5.4	0.5	1.1	8
<i>Establishment Method</i>					
Direct seed	88	27.6	3.2	8.9	41
Transplant	86	34.8	3.8	9.0	45
LSD (0.10)	5	4.2	0.4	0.8	7