Seeding Depth and Triallate For Semi-Hard and Hard Red Spring Wheats

K.J.Kirkland and S.A. Brandt
Agriculture Canada, Expermental Farm
Scott, Saskatchewan

ABSTRACT

The depth of seeding study was conducted with Hy-320, Hy-355, Line-912 and Neepawa wheats sown at depths of 2.5, 5.0, 7.5 and 10.0 cm. Depth of seeding significantly affected all variables measured except bushel weight. There were no variety x depth interactions indicating that all varieties reacted the same to seeding depth. In general deeper seeding delayed emergence and maturity and reduced the number of plants.

Maximum plant stand in the presence of triallate occurred at the 5.0 cm. depth with triallate applied pre-emergent incorporated. When applied preplant incorporated, the presence of triallate reduced plant stands as seeding depth increased. There was no differential varietal responses to triallate.

INTRODUCTION

Depth of seed placement is often a concern for growers when dry conditions prevail at time of planting. Gupta et al (1988) demonstrated that deep planting corn (7.5 cm) delayed emergence from 2 to 18 days depending on soil temperature. It has also been reported that seedling emergence of canola was significantly reduced if seeding depth was increased from 1.5 to 3.0 cm (Nuttall, 1982). Deep seeding winter wheat has resulted in slow plant emergence, a reduction in the number of tillers/plant and fewer heads/m^2 the following year, (Loeppky et al, 1989). In Australia, it was reported that the plant stand of semi-dwarf wheats was reduced when seeded 8 to 10 cm. deep. The cause was attributed to the shorter coleoptile length of semi-dwarf compared with tall wheats (Whan, 1976).

The objective of this study was, (a) to determine if semi-hard wheat varieties (including semi-dwarfs) were affected more by seeding depth than tall hard red spring varieties and, (b) to determine if semi-hard wheat varieties (including semi-dwarfs) react differently to the presence of triallate (Avadex) herbicide in the soil over various seeding depths.

EXPERIMENTAL PROCEDURE

Experiment #A Depths of Seeding

The depth of seeding study was conducted with Hy-320, Hy-355, Line-912 and Neepawa wheats sown at depth of 2.5, 5.0, 7.5 and 10.0 cm. In 1985, seeding was done with a small plot double-disc press drill. Seeding depth was controlled by performing pre-seeding tillage with a small plot cultivator at the desired seeding depth and by adjusting pressure on the double disc opener. A small plot hoe drill was used in subsequent years and depth was controlled by operating depth of the hoe openers. In all cases, good seed-

ing depth control was achieved. In 1988, two tests were sown, one early on April 26 and a later test: May 16. This was done in an attempt to determine whether the cooler soil temperatures associated with earlier seeding would be more damaging where deep seeding was practiced.

Experiment # B Depth of Seeding and Triallate Application Method

Seeding depths, pre-seeding tillage and seeding were all performed the same as the procedures described under Experiment A.

The varieties Neepawa, Hy-320, Hy-355 and Line-912 were seeded at four depths (2.5, 5.0, 7.5 and 10.0 cm) into untreated soil, soil treated with 1.4 kg ai/ha triallate applied PPI (Pre-plant incorporated) and, soil treated immediately following seeding with 1.4 kg ai/ha triallate applied PEI (pre-emergent incorporated). All triallate treatments consisted of the EC formulation applied in 100 l/ha of water at a pressure of 275 kPa. PPI-Pre-Plant incorporated treatments were applied to the soil surface prior to seeding and incorporated with a vibra shank cultivator operating at a depth of 7.5 cm in two operations, the second at right angles to the first. PEI (pre-emergent incorporated) applications were applied to the soil surface following seeding and incorporated with harrows operating at a depth of 2.5 - 3.0 cm in two operations with the second at right angles to the first.

Statistical analyses of the Experiment A tests are summarized in table 1. Depths of seeding significantly affected all factors measured except bushel weight. None of the variety x depth interactions were significant indicating that all varieties reacted the same to depth of seeding.

Table 1. Statistical analyses of data from depths of seeding studies for semi-hard wheats at Scott. (1985-88 combined data including early and late seeded tests in 1988).

	factor				
effect of	days to emerge	days to mature	plants/m of row	yield	bushel wt.
Location years (L)	**	**	**	**	**
Varieties (V)	**	**	**	**	**
Depths (D)	**	**	**	*	ns
L x V	**	**	**	**	**
L x D	**	**	**	**	ns
V x D	ns	ns	ns	ns	ns
L x V x D	ns	**	ns	ns	ns

In general, decreasing seeding depth hastened emergence (table 2). The delay caused by deep seeding varied considerably from year to year and was greatest for the early seeded test in 1988. The delay in emergence led to later development of the deeper sown treatments resultsing in later maturities. It is likely that in 1987 and 1988 delayed emergence allowed the deeper sown treatments to withstand the hot dry conditions experienced early

in the growing season and allowed those treatments to show greater recovery when cooler, wetter conditions prevailed in July. Thus, the effect of seeding depth on yields was not as dramatic as it might have been had more normal conditions prevailed.

Deeper seeding did reduce the number of plants per M of row length, in 1985, 1987 and 1988. In 1986 plant numbers were lowest for the shallowest depth of seeding due to placement of the seed into dry soil.

When averaged over the 5 tests, seeding at 2.5 cm resulted in significantly lower yields than seeding at 5 or 7.5 cm. Most of the difference could be attributed to placement of the seed into dry soil at 2.5 cm depth in 1986 resulting in low yields.

Table 2. Effect of depths of seeding on semi-hard wheats at Scott. (1985-1988 data; early and late seeded tests in 1988).

depth of seeding (cm)	days to emerge	days to mature	plants/m of row	yield kg/ha	bushel wt. lb.
2.5	10	108	45	2800	59
5.0	13	110	41	2940	60
7.5	14	111	40	2910	59
10.0	14	112	37	2870	59
LSD (P=0.05)	0.1	0.3	1.8	70	ns

Analyses performed on the data of Experiment B are summarized in Table 3. Depth of seeding significantly affected yields over all varieties. Seed placed 5.0 cm depth resulted in yields 9, 5 and 7% higher than seed placed at depths of 2.5, 7.5 and 10.0 cm respectively, Table 4.

Table 3 Effect of Seeding Depth and Triallate Application Method on the Growth and Development of Semi-Hard Wheats, Scott, 1986-1988.

	Variety (V)	Depths (D)	Application Methods (M)	V x D	V x M	D x M	V x D x M
Plants/m-row	* *	* *	* *	N.S.	N.S.	*	N.S.
Yield	* *	* *	N.S	N.S.	N.S.	N.S.	N.S.

* Significant at 5% probability level.
* * Significant at 1% probability level
N.S. Not Significant

Table 4. Effect of Seeding Depth on the Yield of Semi-Hard Wheats, Scott, 1986-1988.

Seeding depth (cm)	Yield kg/ha	% of 2.5 cm depth
2.5	3495	100
5.0	3815	109
7.5	3652	104
10.0	3540	102
LSD (0.05)	151	

Both, depth of seeding and Triallate application methods affected the stand establishment. From 2.5 - 4.5 more plants/m-row developed at the 5.0 cm depth than at other depths (Table 5) Triallate application method was a significant factor in stand establishment. Maximum number of plants established in untreated soil, while significant reductions occurred with both application methods when considered over the four depths. No significant differences resulted from the Triallate PEI application method when a seeding depth of 5.0 cm was maintained. There were no variety x depth or variety x application method interactions noted.

Table 5. The Effect of Seeding Depth and Triallate Application Method on the Plant Stand of Semi-Hard Wheats, Scott, 1986-1988.

Seeding depth (cm)	Wheat plant/m- row Application Method, Triallate 1.4 kg/ha Untreated	PPI	PEI	Mean
2.5	34.4	34.7	34.0	34.4
5.0	36.9	32.4	35.1	34.9
7.5	34.1	28.9	28.9	30.7
10.0	32.2	27.0	27.0	28.7
Mean	34.1	30.7	31.3	
LSD (0.05)	Application method 1.53		Depth 1.83	

PPI - pre plant incorporated
PEI - pre emergent incorporated

CONCLUSION

While there have been some suggestions that dwarf and semi-dwarf wheat should not be sown as deeply as conventional types, the data from these studies do not support such a theory. The same seeding guidelines; to place seed as shallow as possible into 2.5 cm moist soil at a depth not greater than 7.5cm; should be used for both the semi-dwarf and conventional spring wheats. These results suggest that such guidelines would be suitable under soil and climatic conditions similar to those experienced at Scott, even with relatively cool soil conditions associated with early seeding.

These results suggest that maximum plant stand can be obtained by seeding at a minimum depth of 5.0 cm and, if triallate is required by applying it pre-emergent incorporated following the seeding operation.

The semi-hard wheat grower can also be assured that in soil types and growing conditions similar to those in the Scott area the response of Hy-320, Hy-355 and Line-912 to Triallate will be similar to the response of the Hard Red Spring variety Neepawa.

REFERENCES

S.C. Gupta, E.C. Schneider and J.B. Swan, 1988. Planting depth and tillage interactions on corn emergence. Soil Sc. Soc. Am. J. 52: 1122-1127.

Loeppky, Heather, G.P. Lafond and D.B. Fowler, 1989. Seeding depth in relation to plant development, winter survival, and yield of no-till winter wheat, Agron. J. 81: 125-129.

Nuttall, W.F. 1982. The effect of seeding depth, soil moisture regime and crust strength on emergence of rape cultivars. Agron. J. 74: 1018-1022.

Whan, B.R. 1976. The association between coleoptile length and culm length in semi-dwarf and standard wheats. Journal of the Australian Institute of Agricultural Science 42: 194-196.