20-40% of their land cleared were within one mile of a road, while all eighteen settlers more than two miles from a road had cleared less than 10% of their land.

Twenty-one of forty persistent 1820 to 1825 settlers were located on a road, with fifteen others within one mile of a road. Of those eighteen settlers more than two miles from a road, all had settled between 1830 and 1840. These results strongly support hypothesis IV, that successful farms and persistence were significantly associated with distance from roads, with persistent and successful settlers tending to be located on or near roads.

Both land cleared (%) and wheat crop (% of clear land) were found to be significantly associated with distance from a grist mill in 1851 (Table 4.14). Fourteen of twenty-eight settlers less than two miles from a grist mill (Figure 4.47) had more than 80% of their land cleared, while twenty-three of eighty-four settlers located less than two miles from a mill had cleared over 60% of their farms. Only four of 103 settlers more than four miles from a mill had cleared more than 60% of their land.

The percentage of a settler's land devoted to wheat was significantly associated with distance to a grist mill. Fifty-five of sixty-eight settlers with more than 40% of their crops in wheat were located less than four miles from a grist mill, while fifty-three of 133 settlers with less than 25% wheat crops were more than four miles from a grist mill. While there was no significant statistical relationship

Figure 4.47 : (Adapted from Sandford Fleming,1848)

between settler persistence and distance from a grist mill, at least part of hypothesis V may be valid. The chi-square tests suggest that those settlers with greater land clearance were located closer to mills, and farmers with highest percentages of land in wheat were significantly closer to grist mills.

It is interesting to note that family size and the wheat crop were significantly associated, with fifty-three of seventy-one large families (9-17 persons) planting more than 25% of their land in wheat, while 115 of 133 settlers with under 25% of their land in wheat had small to average-sized families (1-8 persons).

Table 4.15 summarizes the results of chi-square tests to determine whether land cleared (%) can be associated with Robinson or non-Robinson settlers. The results indicate that, for the years 1826 through 1841, significant differences in land clearance were associated with the two settler groups, supporting hypothesis III.

Table 4.15 Summary of Chi-Square Tests for Robinson vs. Non-Robinson Settlers

Variable	Year Significant
Land Cleared (%)	1826
	1827
	1828
	1830
	1841

Note : Land Cleared (%) significant at 0.05 level.

The results of linear correlation tests for 1841 and 1851 are presented in Table 4.16. Successful settlers (based on land clearance percentage) were significantly associated with time settled in both 1841 and 1851. The relationship was positive with land-cleared values increasing as time settled increased. This association between land cleared and time settled has been found to be significant in each census year from 1822 through 1851, strong support for hypothesis I.

Table 4.16 Significant Linear Correlations 1841-1851

Variables Tested	1841	1851
Clear Land (%)/Time Settled	.4819	.3118
Clear Land (%)/Livestock	.4948	----
Clear Land (%)/Oxen	.1598	----
Clear Land (%)/Clearing Rate	.7048	.3174
Time Settled/Livestock	.3707	----
Time Settled /Clear Land (acres)	----	.2950
Time Settled/Clearing Rate	----	-.4449
Clearing Rate/Family Size	.2078	----
Clearing Rate/Oxen	.1833	----
Clearing Rate/Farm Size	.3579	.3778
Farm Size/Clear Land (%)	----	-.2348
Farm Size/Livestock	.3767	.3963
Clear Land (acres)/Horses	.6420	----
Farm Density/Family Size	-.1786	----
Time Settled/Farm Density	.3418	----
Farm Size/Farm Density	.2718	----
Clear Land (acres)/Farm Size	.4321	.5681
Clear Land (acres)/Family Size	.3071	.2475

Note : Variables significant at 0.01 level.

4.9 Tests For Differences - Robinson vs. Non-Robinson

The null hypothesis for a student's T-test is that the two sets of data are random samples from a common, normally distributed population, or from two identical normally distributed populations, and the alternative hypothesis states that there is a significant difference between the means of the two populations (Ebdon 1985,pp.61-2). The purpose of these tests is to determine whether there were significant differences between the Robinson and non-Robinson settlers in Emily Township for the years 1830, 1841, and 1851. The variables tested include cleared land (acres), cleared land (%), time settled, clearing rate, and farm size.

The results are summarized in Table 4.17. In 1830,

Table 4.17 Summary of Robinson/Non-Robinson T-Test Results

Variable	1830	1841	1851
Clear Land (acres)	F-value 9.49 Sep.Var.Est. T-value -7.71 2-tail prob. .000	F-value 6.00 Sep.Var.Est T-value -7.56 2-tail prob. .000	F-value 1.15 Sep.Var.Est. T-value -.90 2-tail prob. .368
Land Cleared (%)	F-value 11.97 Sep.Var.Est. T-value -8.52 2-tail prob. .000	F-value 5.03 Sep.Var.Est. T-value -7.59 2-tail prob. .000	F-value 1.07 Pool.Var.Est. T-value -.86 2-tail prob. .390
Time Settled (years)	F-value 9.01 Sep.Var.Est. T-value -3.77 2-tail prob. .000	F-value 2.34 Sep.Var.Est. T-value -.41 2-tail prob. .679	F-value 2.03 Sep.Var.Est. T-value .46 2-tail prob. .645
Clearing Rate	F-value 7.50 Sep.Var.Est. T-value -4.96 2-tail prob. .000	F-value 4.43 Sep.Var.Est. T-value -7.65 2-tail prob. .000	F-value 2.06 Sep.Var.Est. T-value .294 2-tail prob. .294
Farm Size	F-value 11.91 Sep.Var.Est. T-value 3.32 2-tail prob. .001	F-value 1.86 Sep.Var.Est. T-value -.77 2-tail prob. .441	F-value 2.16 Sep.Var.Est. T-value -1.29 2-tail prob. .199

significant differences between the Robinson and non-Robinson population are calculated for each variable. By 1841, there were no longer statistically significant differences in farm size and time settled for the two settler groups. The results for 1851 show that no statistically significant differences were to be found between Robinson and non-Robinson settlers for the variables examined.

4.10 Analysis of Variance Tests

One-way analysis of variance is concerned with the differences between samples or classes, and uses the means for each of these samples or classes to summarize their characteristics (Clark and Hosking 1986,p.266). Table 4.18 summarizes the analysis of variance for time settled groups (persistence) which were tested against variables including land clearance (acres), land cleared (%), clearing rate, farm size, wheat production, and distance to grist mills.

The results show that, for the years 1830, 1841, and 1851 statistically significant differences between time settled categories were found for mean acres cleared and mean land cleared (%). In 1830 persistent settlers (1820-25) had a significantly greater number of acres cleared and percentage land cleared than either 1826-28 or 1830 settlers. In 1841, persistent settlers (1820-25 and 1826-30), both had a significantly greater number of acres and percentage land cleared than 1831-41 settlers. In 1851, no significant difference in means may be found between 1820-25 and 1826-30 settlers, but both persistent settler groups had significantly

Table 4.18 Time Settled
Analysis of Variance Summary

VARIABLE	1830	1841	1851
Clear Land (acres)	F-ratio 81.77 F prob. .000 Group 1 vs 2* Group 1 vs 3*	F-ratio 81.65 F prob. .000 Group 2 vs. 3* Group 1 vs. 3* Group 1 vs. 2*	F-ratio 5.97 F prob. .001 Group 2 vs 3* Group 1 vs 4* Group 2 vs 4* Group 1 vs 3*
Land Cleared (%)	F-ratio 77.49 F prob. .000 Group 1 vs 2* Group 1 vs 3*	F-ratio 59.34 F prob. .000 Group 2 vs. 3* Group 1 vs. 3* Group 1 vs. 2*	F-ratio 5.55 F prob. .001 Group 2 vs. 3* Group 2 vs. 4* Group 1 vs. 4*
Clearing Rate (acres per year per settler)	F-ratio 15.33 F prob. .000 Group 3 vs. 2* Group 3 vs. 1*	F-ratio 9.99 F-prob. .000 Group 1 vs. 2* Group 1 vs. 3*	F-ratio 13.66 F prob. .000 Group 4 vs. 1* Group 4 vs. 2* Group 4 vs. 3*
Farm Size (acres)	F-ratio 1.91 F-prob..1513	F-ratio 7.03 F-prob. .001 Group 1 vs. 3* Group 1 vs. 2*	F-ratio 1.45 F prob. .2314
Wheat Production (bushels)			F-ratio 4.82 F prob. .003 Group 1 vs. 3* Group 1 vs. 2*
Wheat Yield (bu./acre)			F-ratio .6445 F prob. .5877
Distance to Mill			F-ratio 5.77 F prob. .001 Group 3 vs. 1* Group 4 vs. 1* Group 4 vs. 2*

Time Settled Categories

1830 - Group 1 - 1820-25
Group 2 - 1826-28
Group 3 - 1830

1841 - Group 1 - 1820-25
Group 2 - 1826-30
Group 3 - 1831-41

1851 - Group 1 - 1820-25
Group 2 - 1826-30
Group 3 - 1831-41
Group 4 - 1842-51

Note : * denotes significant difference between groups at 0.05 level.

higher means than 1831-41 and 1841-51 settlers.

Analysis of variance techniques were also used to further test hypothesis IV, regarding successful farms and distance to roads, and hypothesis V, concerning distance to mills and land clearance. The results (Table 4.19) show that, for the year 1841, statistically significant differences between land cleared (%) categories were found for distance to roads.

Table 4.19 Analysis of Variance Summary 1841-1851

Variable	Distance to Road (1841)	Distance to Mill (1851)
Land Cleared (%)	F-ratio 10.79 F prob. .0000 *Group 2 vs. Group 4 *Group 1 vs. Group 4,3,2 Group - Mean 1-18.4 2-14.0 3-10.3 4- 5.2	F-ratio 16.96 F prob. .0000 *Group 2 vs.Group 4,3 *Group 1 vs.Group 4,3 Group-Mean 1-47.7 2-42.7 3-33.3 4-29.2
Time Settled	F-ratio 4.69 F prob. .0035 *Group 2 vs. Group 4 *Group 1 vs. Group 4 Group-Mean 1-15.1 2-13.7 3-12.8 4-10.0	F-ratio 8.69 F prob. .0000 *Group 1 vs. Group 3 *Group 2 vs. Group 3,4 Group-Mean 1-22.9 2-24.6 3-17.7 4-18.7
Wheat Production (bushels)		F-ratio 10.40 F prob. .0000 *Group 2 vs. Group 4,3 *Group 1 vs. Group 4,3 Group-Mean 1-203 2-192 3-109 4- 90
Wheat Yield (bu./acre)		F-ratio 4.96 F prob. .0022 *Group 2 vs. Group 4 *Group 3 vs. Group 4 *Group 1 vs. Group 4 Group-Mean 1-15.4 2-14.8 3-15.0 4-12.2

Note: * - significant at .05 level

Distance to Road Categories
1-on road 2-less than 1 mile
3-1-2 miles 4-more than 2 miles

Distance to mill categories
1-less than 1 mile 2- 1-2 miles
3- 2-4 miles 4- more than 4 miles