

WHEEL PATH RECOVERY

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OBJECTIVES: To determine the degradation of wheel paths (roads) over time with normal tillage. To determine number of years of normal tillage and cropping to return soil to original or comparable state.

PROCEDURE: The paths to be studied were created in 1984 and used for conduct of system studies with the wide tractive research vehicle (WTRV) until 1989. In 1990 the guidance wire was removed and the paths only were subsoiled on 15 inch centers to a depth of about 18 inches. The entire field was then disk harrowed twice with all traffic east to west to prevent movement of path soil into plot areas. The field was then bedded, preirrigated, and planted to black-eye beans which were allowed to grow until late July. The field was then irrigated to wet the soil to beyond 3 feet and penetrometer measurements made in plot and path areas.

RESULTS: The penetrometer data was analyzed for difference in means and differences in data distribution by treatments. When an accumulative distribution of data by treatments was plotted it was apparent that more variability existed among path data than in plot data. Using an univariate analysis it can be shown that the standard deviation for the path areas was between 1.38 and 1.43 MPa compared to the treatment areas with 0.64 MPa or 2.14 times greater. Using F-tests the probability that these are not the same exceeds 99.9%. The data could be from normal distributions but the data is skewed with less than expected low values. The path data could be fitted as a uniform distribution. The standard farmer approach to removing compaction (subsoiling) is not sufficient to remove the compaction within the fractured consolidates. There was no difference in the mean penetration resistance among paths and plots in the zone between the surface and 20 cm. This may be explained by the disk tillage which probably extended to 20 cm. At depths below 20 cm the mean penetration resistance for the paths was 15 to 18 MPa compared to 7 MPa for the plot areas which represents a very large difference and could easily explain the poor growth of beans.

Deep tillage with subsoilers will not remove compaction of road-ways within 1 year. Perhaps the bad news is that variability among zones within the tilled path zones is much greater than old plot area and no tillage machinery is available to directly influence this variability.

FUTURE PLANS: The field has been mapped to locate the old path areas. After normal tillage operations in 1991 and a crop, another series of penetrometer reading will be made. These data will be compared to the 1990 data to assess any improvement in

soil variability or penetrability.

SUMMARY OF UNIVARIATE STATISTICS FOR PATH AND PLOT AREAS
PENETROMETER DATA IN MPa

STATISTIC	PATH AREA POOR GROWTH	PATH AREA W/ NO GROWTH	PLOT AREAS
mean	2.29	2.44	1.26
S.D.	1.38	1.43	0.64
variance	1.922	2.054	0.407
CV	60.7	58.7	50.6
W:NORMAL	0.93	0.93	0.93
Skewness	0.57	0.51	0.99
Kurtosis	-0.41	-0.43	2.61
Mean: top zone	5.6	6.2	5.0
Mean: till zone	15.5	17.5	6.9
Mean: deep zone	15.5	15.4	8.3