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Nearest Neighbour Analysis of Potato Yield Grown in Sodic Soil

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SUMMARY

An attempt has been made to apply Wilkinson et al [5] nearest neighbour technique of analysis on the experimental data of potato yield (large size tuber) obtained from CSSRI, Karnal. It lowered C.V. (%) to a great extent as compared to the C.V. (%) computed from randomised block design in sodic soil. Ph values give justification for the application of this technique.

Keywords : Nearest neighbour technique of analysis; PH values; Sodic soil.

Introduction

In patchy soils, often it is not possible to control effectively the error in field experiments. by conducting experiments in block designs. Under such circumstances, Bartlett [1] has considered theoretical aspects of Papadakis's [2] method of analysis and suggested iteration using treatment estimates from the previous iteration to redefine the nearest neighbour covariate for the current plot. He has indicated that the technique may be efficient for controlling error to a further extent in field experiments on patchy soils. Pearce and Moore [3], Pearce [4] and others have provided evidence of the method in reducing experimental error. Wilkinson el al [5] concluded that papadakis's method is biased and very much inefficient in the presence of substantial fertility trend. They have suggested another neighbouring technique, which is a continuous form of local detrending in contrast to the stepwise (fixed) block detrending of classical method of analysis. Here an attempt has been made to apply Wilkinson et al [5] neighbour technique on the yield of potato grown in sodic soil at CSSRI, Karnal.

2. *Material and Methods*

A field experiment was conducted in 1988 in a randomised block design with five replications. There were three irrigation levels. Plot was of size 4.8 m^2. As per the design, analysis of variance was carried out. Also NN (nearest neighbour) analysis was carried out utilising iterative process as described by

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Wilkinson et. al [5] technique as per the programme in MSTAT-C developed by MSTAT team of Michigan State University [6].

3. *Results and Discussion*

From the analysis of variance as shown in Table-1, it is observed that the c.v. (%) for 3-plot block is 30.34. On the other hand, considering the layout as rows and columns, as given in Table 2, NN (analysis) has been conducted, where in cv(%) is only 3.27 (Table 3). Thus, it may be concluded that NN (analysis) may offer as an alternative way to patchy soils when c.v. (%) is very much high and block designs are able to remove variability only partially leaving much due to patchy conditions of the soil. Map of yield trends indicate that rows 1 and 4 have low fertility whereas rows 2 and 5 have high fertility. However, in row 3, two plots are having low fertility. Table 5 relating to PH values in 0-18 cm. depth confirm the trend values.

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Table 1. Analysis of variance of potato yield grown in sodic soil at CSSRI, Karnal

ANOVA		
Source	d.f.	MS
Replication	4	2 . 1523
Treatment	2	24. 0843
Error	8	1. 0327
CV (%)	30.34	

Table 2. Layout of the field experiment considering rows and columns Potato yield (kg/plot)

	col . 1	col . 2	col . 3
row 1	I_3 0.800	I_1 2. 900	I_2 2 . 750
row 2	I_1 5 . 800	I_2 3. 925	I_3 2 . 650
row 3	I_2 6 .175	I_3 1.000	I_1 3 . 850
row 4	I_3 1 . 450	I_1 3 . 875	I_2 3 . 050
row 5	I_2 3 . 950	I_3 2 . 000	I_1 6 . 025

Table 3. NN analysis of potato yield grown in sodic soil at CSSRI, Karnal

Components of Variance :	
Total	2 . 731
Treatments (Irrigation levels)	1 . 773
Yield trends	0 . 946
Plot error	0 . 012
C. V. (%)	3. 27

Table 4. Map of yield trends : (percent deviation from trial mean)

	Col . 1	Col . 2	Col . 3
row 1	–47	–37	–29
row 2	25	0	75
row 3	58	–33	–16
row 4	–4	–16	–21
row 5	1	32	29

Table 5. PH values for different plots in 0 - 15 cm. depth

	Col . 1	Col . 2	Col . 3
row 1	9 . 35	9. 15	9 . 50
row 2	8 . 40	8 . 50	8 .45
row 3	8 . 25	8 . 85	8 .65
row 4	8 . 75	8 . 25	9 . 05
row 5	8 . 40	8 . 30	8 . 85

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