

()

(*T. aestivum*. L.)

()
(// : // :)

()

/ /

-

-

/ / /

/ /

/ /

-

/ /

-

-

:

()

()

)

(

(

()

/ /

- () - ()
() ()

)

(

() -

()

- ()

(.)

...

() -

()

... :

() () () ()
()

t

() - : () / ()

() / ()

(ΔY_{max})

(X)

() () () ()
(ΔY_{max}) (X)

X

Y

(ΔY_{max})

() (χ^2)

4. Bartlett's test

1. Vitavax
2. Zadok's scale
3. One way variance analysis or completely randomized design (CRD)

(R^2)
 $()$
 $() n_1$
 $(n_3) (n_2)$
 $F ()$
 $() R^2$
 ΔY_{max} Mstatc
 $(/) \chi^2 () SAS$
 $(/ **)$ $(/ *)$
 $F () -$
 $(/)$
 $(/)$
 $(DTPA) / (/) /$
 $(R^2) F$
 $(/)$
 $(/) \chi^2$
 $(/ - /) (/)$
 $(/)$

...

:

.() -

(χ^2)	(R^2)	F	n_2	n_1	()	(ΔY_{max})	(Y_{max})	(Y_0)
------------	---------	---	-------	-------	-----	--------------------	-------------	---------

/ ns	/ ns	/ ns
/ ns	/ ns	/ *
/ ns	/ **	/ **
/ ns	/ *	/ **
/ ns	/ *	/ **
/ ns	/ *	/ **
/ **	/ **	/ **
/ **	/ ns	/ **
/ **	/ ns	/ *
/ **	/ ns	/ ns
/ *	/ ns	/ ns
/ ns	/ ns	/ ns

** * ns (;

(. /

.() -

(χ^2)	(R^2)	F	n_1	n_3	n_2	n_1	n_3	()	(ΔY_{max})	(Y_{max})	(Y_0)
------------	---------	---	-------	-------	-------	-------	-------	-----	--------------------	-------------	---------

/ ns - / ns	/ ns - / **	/ ns - / **
/ ns - / **	/ ns - / **	/ * - / **
/ ns - / ns	/ ** - / **	/ ** - / **
/ ns - / **	/ * - / **	/ * - / **
/ ns - / **	/ * - / **	/ * - / **
/ ns - / **	/ * - / **	/ ** - / **
/ * - / **	/ ** - / **	/ ** - / **
/ ** - / **	/ ns - /	/ * - / *
/ * - / *	/ ns - /	/ ns - / ns
/ *	/ ns	/ ns

** * ns (;

(.. /
(. n1

n1

... :

(DTPA) /

F_{max} . ()
(/ ^{ns}) C (/ ^{ns}) . /

()

(/ **) (/ *)

/

-

()

/

)

/ /

()

.(

.()

/

()

()

-

/ - /

-

(DTPA) /

-

()

/ /

/

/

()

.()

/

/

()

χ²

()

(/ *)

/ - /

C (/ ^{ns})

F_{max}

(/ ^{ns})

-

-

/

/

... :

- ()

.()

)

(

)

.(

-

- ()

()

) F

.()

(

F

()

t

()

/ / / /

)

/ /

(*

/ /

F

REFERENCES

- ()
- ()
- ()
- ()
- MSTATC
13. Agrawal, H. P. 1992. Assessing the micronutrient requirement of winter wheat. *Commun. Soil Sci. Plant Anal.* 23 (17-20): 2255-2568.
14. Amer, F. M. 1995. Soil test modifiers for coarse - textured calcareous soils. *Commun. Soil Sci. Plant Anal.* 26 (17/18): 3023-3032.
15. Bray, R. H. 1944. Soil plant relationships: I. The quantitative relation of exchangeable K to crop response to potash additions. *Soil Sci.* 58: 305-324.
16. Bray, R. H. 1958. The correlation of a phosphorus soil test with the response of wheat through a modified Mitscherlihk equation. *Soil Sci. Soc. Am. Pro.* 22: 314-317.
17. Cakmak, I., A. Yilmaz, M., Kalayci, H. Ekiz, B. Torun, B. Erenoglu, & H.J. Braun. 1996. Zinc deficiency as a critical problem in wheat production in Central Anatolia. *Plant and Soil* 180:165-172.
18. Cate, R. B. Jr., & L. A. Nelson. 1971. A simple statistical procedure for partitioning soil test correlation data into two classes. *Soil Sci. Soc. Am. Pro.* 35:658-660.
19. Cate, R. B., Jr., & L. A. Nelson. 1965. A rapid method for correlation of soil test analyses with plant response data. *North Carolina Agric. Exp. Stn. International Soil Testing Series, Tech. Bull. No.1.*
20. Dow, A.I., & S. Roberts. 1982. Critical nutrient ranges for crop diagnosis. *Agron. J.* 74: 401-403.
21. Dwivedi, B. S., & K.N. Tiwari. 1992. Effect of native and fertilizer zinc on dry matter yield and zinc uptake by wheat (*Triticum aestivum*) in Udic Ustochrepts. *Trop. Agric.* 69:357-361.
22. Fageria, N. K., V. C. Baligar, & C. A. Jones. 1991. *Growth and mineral nutrition of field crops.* Marcel Dekker, Inc.

- ...
23. Harmsen, K., K. D. Shepherd, & A. Y. Allan. 1983. Crop response to nitrogen and phosphorus in rainfed agriculture. p. 223-248. In: Nutrient balances and the need for fertilizers in semi-arid and arid regions. proc. 17th Colloquium. Int. Potash Ins., Bern, Switzerland.
24. Havlin, J. L., & P. N. Soltanpour. 1982. Greenhouse and field evaluation of the NH_4HCO_3 -DTPA soil test for Fe. *J. Plant Nutr.* 5(4-7): 769-783.
25. Keisling, T. C., & B. Mullinix. 1979. Statistical considerations for evaluation micronutrient tests. *Soil Sci. Soc. Am. J.* 43: 1181-1184.
26. Krentos, V. D., & P. I. Orphanos. 1979. Nitrogen and phosphorus fertilizers for wheat and barley in a semi-arid region. *J. Agric. Sci. (Camb.)* 93: 711-717.
27. Kumar Das, D. 1997. *Introductory Soil Science*. Kalyani Publishers, India.
28. Marschner, H. 2002. *Mineral nutrition of higher plants*. Elsevier Science Ltd.
29. Matar, A., J. Torrent & J. Ryan .1992. Soil and fertilizer phosphorus and crop responses in the dryland Mediterranean zone. *Soil Sci*: 18:82 –146.
30. Matar, A. E., E. Jabbour, & K. El Hajj. 1987. Prediction of barley response to fertilizers by means of soil nitrogen and phosphorus tests. p. 12-22. In: A. Matar, N. Soltanpour, and A. Chouinard (eds.). *Soil Test Calibration in West Asia and North Africa*. Proc. Second Regional Soil Test Calibration Workshop, 1-6 Sept. Turkey. ICARDA, Aleppo, Syria.
31. Melsted, S. W, & T. R. Peck. 1973. The principle of soil testing. p. 85-98. In : L. M. Walsh , & J. D. Beaton(eds.). *Soil testing: correlating and interpreting the analytical results*. SAS Special Publication No. 29. Amer. Soc. Agron., Madison, W.I.
32. Nelson, L. A., & R. L. Anderson. 1984. Partitioning of soil test crop response probability. p. 19-38. In: T. R. Peck, J. T. Cope, Jr & D.A. Whitney. *Soil testing and interpreting the analytical results*. Soil Sci. Soc. Amer. Inc.
33. Roelfs, A. P., R. P. Singh, E. E. Saari & Hettel, G. P. 1992. *Rust diseases of wheat: Concepts and methods of disease management*. Mexico, D. F.: CIMMYT.
34. SAS Institute. 1985. *SAS user's guide: statistics version 5 ed*, SAS Inst. Inc. Gary, N.C.
35. Sillanpää, M. 1982. Micronutrients and the nutrient status of soils: A global study. *FAO Soils Bulletin* 48. Food and Agriculture Organization of the United Nations, Rome. pp. 75-82.
36. Sims, J. T. & G. V. Johnson. 1991. Micronutrient Soil tests. p. 427-477. In: J. J. Mortvedt, F. R. Cox, L. M. Shuman and R. M. Walch. *Micronutrients in agriculture (second edition)*. Soil Science Society of America, Inc. Madison, Wisconsin, USA.
37. Singh, J. P., Karamanos, R. E., & Stewart, J. W. B. 1987. The zinc fertility of Saskatchewan soils. *Can. J. Soil Sci.* 67:103-116.
38. Soltanpour, P. N., M. El Gharous, A. Azzaoui, & M. Abdelmonem. 1987. Nitrogen and phosphorus soil-test calibration studies in the Chaouia Region of Morocco. p. 67-81. In: A. Matar, N. Soltanpour, and A. Chouinard (eds.). *Soil Test Calibration in West Asia and North Africa*. Proc. Second Regional Soil Test Calibration Workshop, 1-6 Sept. Turkey. ICARDA, Aleppo, Syria.
39. Soltanpour, P. N., M. El Gharous, & A. Azzaoui. 1986. Nitrogen and phosphorus soil test calibration studies in Morocco. p. 85-95. In: *Proceeding of First Soil Test Calibration Workshop June 1986*. ICARDA, Aleppo, Syria.
40. Soltanpour, P.N., A. Matar & K. Harmsen. 1988. Program of work for the regional network of soil test calibration study sites in limited rainfall areas. p. 111-116. In: A. Mara, P. N. Soltanpour and Amy Chouinard (eds.). *Soil test calibration in West Asia and North Africa*. Proc. of the Second Regional Workshop Ankara, Turkey, 1-6 Sept. 1987. ICARDA, Aleppo Syria.
41. Tandon, H. 1995. *Micronutrients in soils, crops and fertilizers*. Fertilizer Development and Consultation Organisation. New Delhi, India.