

Supplementary data

Geostatistical approach for testing wheat lines using a non-replicated design

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Appendix – R Commands

```
rm(list=ls())
library(gstat)
library(sp)
mc = read.table("d:/R/Geostat/Input_file.txt")
# {Input_File = Row Columns Yield class = Null for a tester and number for a line }
n = length(mc[,3])
nf = max(mc[,1])-min(mc[,1])+1 # Number of rows in test area
nc = max(mc[,2])-min(mc[,2])+1 # Number of columns in test area
xy = subset(mc,mc[,4]==0)
np = length(xy[,3]) # Number of testers
x = xy[,1:2]
y = xy[,3]
u = dist(x) # Matrix of Euclidian distances of points
d = dist(y) # Semivariances of points
v = as.vector(0.5*(dist(y)^2))
yo = xy
names(yo) = c("F","C","Yo")
F = as.numeric(yo[,1])
C = as.numeric(yo[,2])
coordinates(yo) = ~F+C
var1=variogram(yo$Yo~F+C, cutoff=round(min(nf,nc)/3,0), width=1, cressie=FALSE, data=yo)
model.var1 = vgm(psill=var(y)/2, model="Exp", range=round(min(nf,nc)/3,0), nugget=0)
fit.var1 = fit.variogram(var1, model.var1, fit.sills=TRUE, fit.ranges=TRUE)
Co = fit.var1$psill[1] # Co = Nugget
Co_C = Co+fit.var1$psill[2] # Co+C = Threshold
Ao = round(3*fit.var1$range[2],2) # a = Range
R = exp(-(u/Ao)^2) # np x np = Matrix R = correlations
R = as.matrix(R)
diag(R) = 1
S = Co*diag(np)+Co_C*R # Matrix of variances-covariances
um = rep(1,np) # Estimating the mean = mu
mu = solve(t(um)%solve(S)%um)%solve(S)%y
# Prediting n-np values (ordinary krigin)
result = as.data.frame(matrix(0,nf*nc,8)) # results = F C Yo Ye HW Class Select
names(result) = c("nobs","Row","Column","Yo","Ye","HW","Class","Select")
for (i in 1:n) {
x0 = c(mc[i,1],mc[i,2]) # is a point to be predicted
u0 = dist(rbind(x0,x))[1:np]
r = exp(-(u0/Ao)^2)
y0 = mu+(Co_C*t(r))%solve(S)%mu
vy0 = Co_C-(Co_C*t(r))%solve(S)%Co_C*r
HW = (qnorm(0.975,y0,sqrt(vy0))-qnorm(0.025,y0,sqrt(vy0)))/2
result$nobs[i] = i
```

```
result$Row[i] = mc[i,1]
result$Column[i] = mc[i,2]
result$Yo[i] = mc[i,3]
result$Ye[i] = y0
result$HW[i] = HW
result$Class[i] = mc[i,4]
if (mc[i,4] ==0) result$Select[i] = "Tester"
if (mc[i,4] !=0)
  if (mc[i,3] > y0+HW) result$Select[i] = "Selected" else result$Select[i] = "Discarded" }
write.table(result,"D:\\R\\Geostat\\Out_File.csv", sep = ";", dec = ".", row.names = FALSE)
```