Philip M. Fearnside
July 25, 1977

SUMMARY OF PHASEOLUS YIELD REGRESSION:

1.) ORIGNINAL DATA SET: 120 cases

2.) CULLING THE DATA SET:

a) INVALID DATA:

- fields with areas less than 1.0 hectare
- questionable data (noted contradictions or vagueness in colonist responses) for yield, disease or areas
- incomplete data for yield, density, interplanted maize density, disease, or pH

b) EXCLUDED CATEGORIES OF VALID DATA:

- fields with disease of any intensity
- fields with poor germination reported

3.) ADJUSTMENTS AND TRANSFORMATIONS OF DATA:

- pH "adjusted to 5.7", meaning that pH values above 5.7 were reassigned the value 5.7. This corresponds to the expectations from the linear response-plateau model for yield prediction using a value from the literature as the critical value above which further increases in pH will have no effect on Phaseolus yield.
- the natural log of planting density is used

4.) REGRESSION EQUATION FOR PHASEOLUS YIELDS:

$$\text{Phaseolus yield (kg/kg seed sown)} = 69.77 * \ln \text{DENSITY (plants/ha)} * \text{pH (adjusted)} - 1.50 * 10^{-3} * \text{maize density (plants/ha)} + 267.64$$

$p = 0.0263$

$r = 0.7901$

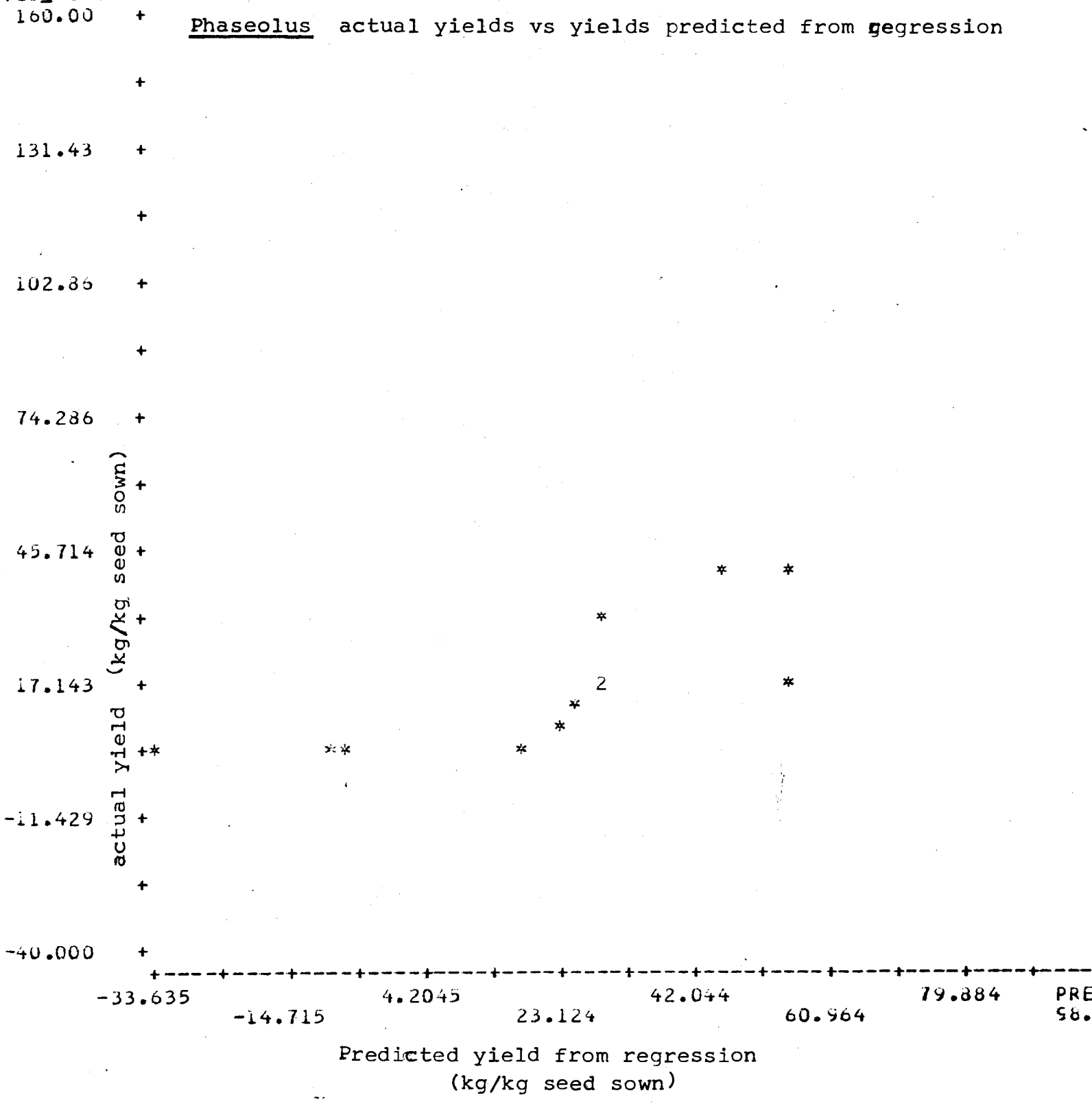
$r^2 = 0.6242$

$SE = 29.802$

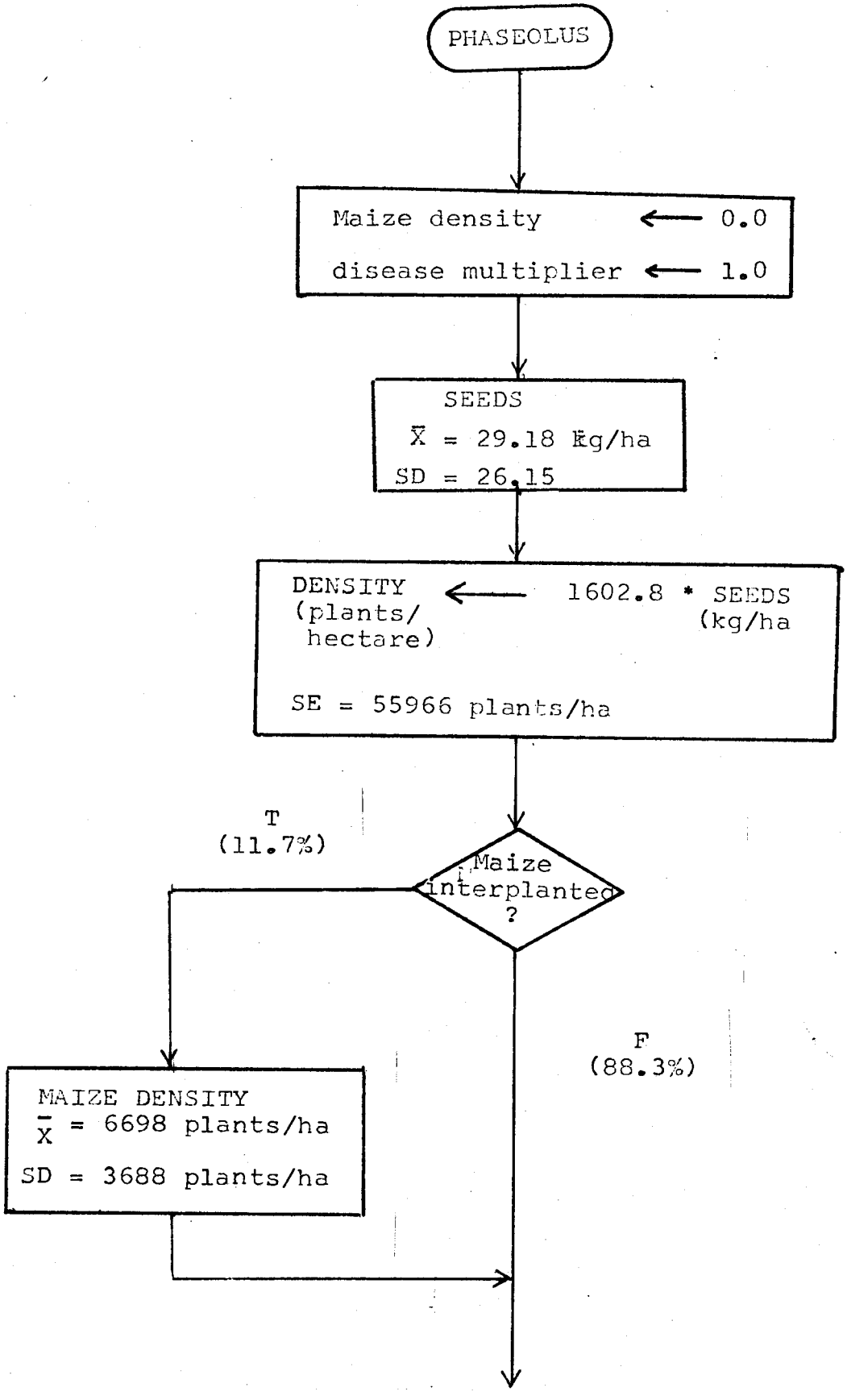
$N = 13$

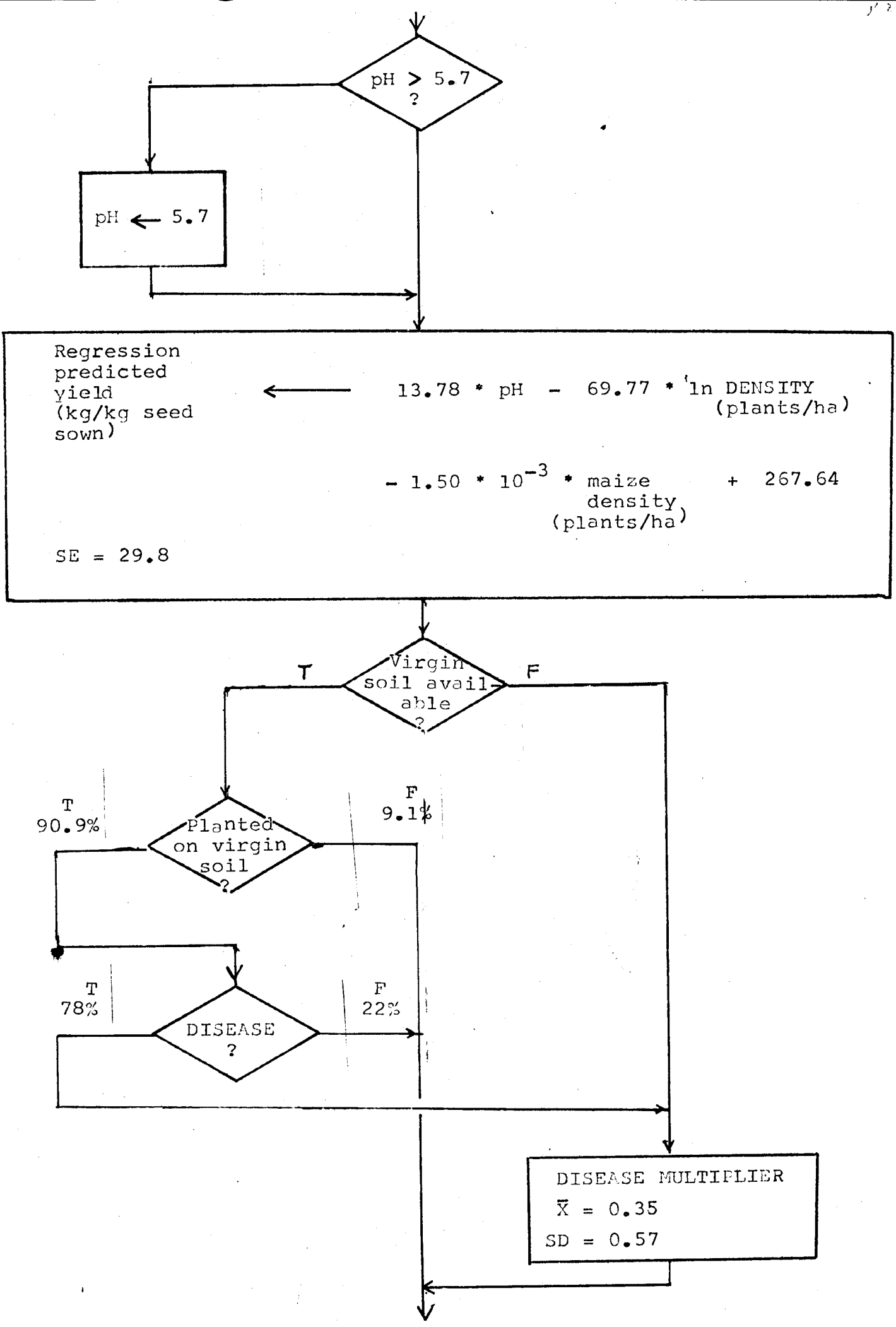
IS 0.62418 TO BE USED>

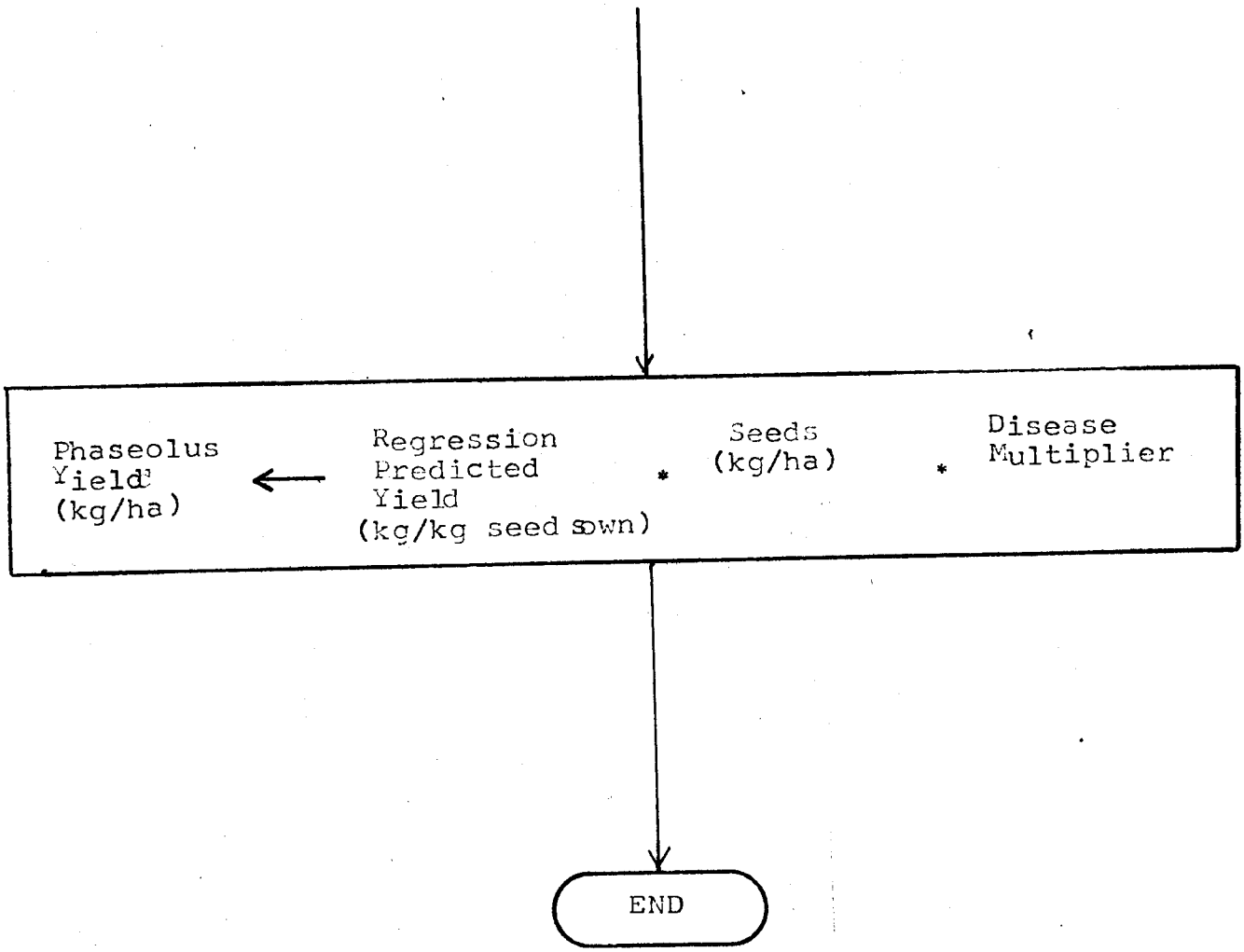
SCATTER PLOT PHASEOLUS ACTUAL VS PREDICTED YIELDS FROM REGRESSION ON LOG PLANTIN
DENSITY AND PH (ADJUSTED TO 5.7) FOR FIELDS AT LEAST 1.0 HA IN AREA WITH NO DISEA
PROBLEMS AND NO EXCLUDED DATA. SIGNIF IS 0.0263 R-SQR IS 0.62418 TO BE USED
N= 13 OUT OF 120 9003.YLD_KGSD VS. 9101.PRE3V1HA



Phaseolus actual yields vs yields predicted from regression


PHASEOLUS
Maize density ← 0.0
disease multiplier ← 1.0
SEEDS
X̄ = 29.18 Kg/ha
SD = 26.15
DENSITY (plants/ hectare) ← 1602.8 * SEEDS (kg/ha
SE = 55966 plants/ha
T (11.7%)
Maize interplanted ?
F (88.3%)
MAIZE DENSITY
X̄ = 6698 plants/ha
SD = 3688 plants/ha


pH > 5.7 ?
pH ← 5.7
Regression predicted yield (kg/kg seed sown)
← 13.78 * pH − 69.77 * ln DENSITY (plants/ha)
− 1.50 * 10^-3 * maize density (plants/ha) + 267.64
SE = 29.8
Virgin soil available ?
T
F
Planted on virgin soil ?
T 90.9%
F 9.1%
DISEASE ?
T 78%
F 22%
DISEASE MULTIPLIER
X̄ = 0.35
SD = 0.57


Phaseolus Yield (kg/ha)
Regression Predicted Yield (kg/kg seed sown)
Seeds (kg/ha)
Disease Multiplier
END