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GENOTYPE X ENVIRONMENT INTERACTIONS IN SUGAR BEET-EFFICIENCY OF
AMMI AND OTHER BIOMETRICAL MODELS

ABSTRACT
Sugar beet (Beta vulgaris, L) is cultivated in India as a supplementary sugar crop. It is sown in
October-November and harvested from mid-March to May when temperatures range between 38°C to
45°C. Industrial processing of sugar beet started at Sriganganagar (Rajasthan) in 1972. In multi
location varietal trials it is important to identify stable as well as location specific varieties. The main
objectives of the present study are to study i) G x E interaction and stability in exotic genotypes by two
stability models, ii) to apply Additive Main Effects and Multiplication Interaction (AMMI) Matmodel in
sugar beet, and iii) to compare the relative efficiency of these two models in sugar beet. Sixteen sugar
beet genotypes, from different countries of Europe, North America, and USSR, were evaluated at 8
locations having varying climatic conditions in RBD data on root yield/plot, sucrose % juice were
recorded at harvest. Significant differences among genotypes for root yield were observed. In plant
breeding programmes, most biometrical models have used replicated data for stability analysis. AMMI
Matmodel has previously been used in sugarcane (Srivastava et al., 1999, 2001) using replicated
data. However, AMMI Matmodel is quite effective, even with un-replicated data, if the numbers of
genotypes and environments are large. In the present study, the G x E was first studied by Eberhart &
Russell (1966) model with replicated data. Subsequently, the mean root yield data of each location
was used to study G x E from this un-replicated data by AMMI Matmodel. The Anova for the AMMI-2
model shows that G x E is twice as large as the genotype (G) main effect. IPCA-1 alone is larger than
genotype main effect. The IPCA-1 scores and bi-plot suggest that the Lucknow location is unique, with
IPCA-1 near zero and its main effect (41.38) rather close to the grand mean. Two main mega-environ-
ments were identified. Kawe Megapoly wins in environments 3, 4, 5, and 7 while Kawe Percopoly wins
in environments 2, 6, and 8. According to the AMMI-1 model that is more accurate than the raw data.
This paper discusses the stability of genotypes as assessed by these two models and the efficiency of
AMMI Mat model for sugar beet and other root crops.

INTERACTIONS GÉNOTYPE-ENVIRONNEMENT EN BETTERAVES SUCRIÈRES –
L’EFFICACITÉ DE AMMI ET D’AUTRES MODÈLES BIOMETRIQUES

ABRÉGÉ
Version française pas disponible.

GENOTYP-UMWELT-INTERAKTIONEN IN ZUCKERRÜBEN –
EFFIZIENZ VON AMMI UND WEITEREN BIOMETRISCHEN METHODEN

KURZFASSUNG
Deutsche Version nicht verfügbar.