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ANALYSIS OF SUNFLOWER FIELD DATA

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SUMMARY

For the improvement of sunflower growing the results of the experiments must be completed with the scientific analysis of data coming from production.

The collection of data occurs directly in the production. Every year from more and more agricultural units about 70-100 variables are provided. In 1986 we had data of 2000 agricultural fields, about 130.000 hectars.

The variables involved the following subjects: precipitation, soil parameters, previous crop, soil tillage, varieties, sowing, weedness, plat protection, fertilization, damage, harvesting.

The purpose of the examination was to establish the influence of different factors on the yield of sunflower and in the last years their effects on the oil content as well.

In the paper data preparation, control and processing are dealt with.

In addition to the "conventional" statistical methods the evaluation was completed with complex interaction analysisis by exploratory methods as Principal Component Analysis, Discriminance Analysis and Correspondance Analysis.

Finally, the most important results are presented which can be directly used in production.

INTRODUCTION

There is no general method for this type of data collecting and processing. The Research Institute for Vegetable Oil and Detergent Industry and the University of Agricultural Sciences of Gödöllő has been working together to work out this method for more then 10 years.

The purpose of the examination was to establish the influence of different factors on the yield of sunflower and in the last years their effects on the oil content as well.

MATERIALS AND METHODS

The collection of sunflower field data was done by questionaries which were filled in by producers. During the years the registration extended to more and more fields - e.g. in 1986 we had data of 130.000 ha /about 2.000 agricultural fields/. The number of the questions concerning to one field changed - depending on results of previous years - between 70-100.

The following subjects were involved: precipitation, soil parameters, previous crop, soil tillage, varieties, sowing, weedness, plant protection, fertilization, damage, harvesting. In the last 3 years the previous questions were completed with oil contents, li-

nol acid % and thousand-grain-weigh data, analysed from the samples of the fields in the Central Laboratory of the Research Institute.

There are 3 steps in the evaluation of the collected data.

control and preparation of the data
"conventional" statistical analysis
exploratory analysis

The control and preparation of the data is the most critical phase of the work taking about 6o % the invested time. All these problems were solved by an preparatory program system /Baráth 1982/.

These univariete analysisis aren't informative enough because there are interactions between the variables. That's why the evaluation is completed with exploratory analysis, as Principal Component Analysis, Discriminance Analysis or Correspondance Analysis /Sváb 1979/.

RESULTS AN CONCLUSION

We have no possibility to recite detailed results so we only draw attention to some general conclusions.

Conclusions concerned the yield:

The yield of the fields being poor in carbonate is 15-2o % less, than teh others being rich in carbonate.
The sunflower can be grown everywhere except very sodic soils, light sandy or heavy clay soils. It is not resonable to grow it in the best fields of maize or sugar beet.
It can be grown succesfully after winter wheat and maize but clover and lucerne are bad previous crops.
The tardy, spring cultivation and sowing /after 15th May/ reduce the yield significatly.
The main agrotechnical problem is the imperfect stand and ist effect on weeds. That's why the quality of the sowing-seed is very important.
The loss caused by diseases is high only in case of bad weather.
After using defolians, having a late harvest in case of out-of-date harvesters a loss of 15-2o % can be caused.

Conclusions concerned the oil %:

The quantity of the oil per hectars in determined by the quantity of yield.
The oil % is higher on areas with more precipitation.
The high $CaCO_3$ level and the alcalic pH is unfavourable.
The different oecological environment has no influence on the differences among the varieties.
The early use of defolians reduces the oil contents.
The great amount of N and P fertilizers used in the autumn has also negative effect on the oil contents.

PATH-COEFFICIENT ANALYSIS OF COMPONENTS OF SUNFLOWER SEED YIELD (*H. annuus* L.) II

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Seed yield is a complex trait which is affected by a large number of factors which act alone or in combination. Information should be gained on the relationship of this trait with the other traits of the plant and the seed.

This paper reviews a part of an international project of sunflower genetic studies which should supply data on direct and indirect effects of seven biomorphological traits (days to flower, plant height, number of leaves, husk content, seed length, seed width, seed thickness) on seed yield expression.

Experimental materials used in the project were seven inbred lines (HA-5-4-3, GR-8, CPK-34, D-34-a-10, P-32, M-6/4, B-777-43) which draw origin from different populations, and 21 hybrids made by crossing these lines.

The materials were sown after the system of random blocks in three replications. Fourty-five plants per treatment were analysed. Samples for the analysis of husk content were 2 x 5 g per plant. Seed length, width, and thickness (mm) were measured in laboratory on the basis of samples which contained 900 seeds each.

A path coefficient analysis after the method of Wright (1921) was made in order to assess direct and indirect effects of the examined components on seed yield.

Highly significant positive correlations were found between seed yield per plant on one side and plant height, seed length, width, and thickness on the other. A non-significant positive correlation was found between seed yield and number of leaves per plant. A negative correlation was found between seed yield and days to flower and a highly significant negative correlation between seed yield and husk content.

Days to flower was highly significantly positively correlated with plant height, number of leaves per plant, and seed length. Also, days to flower was non-significantly positively correlated with husk content and negatively correlated with seed width and thickness.

Plant height was positively correlated with husk content and highly significantly positively correlated with number of leaves per plant, seed length and width.

Number of leaves per plant was highly significantly positively correlated with husk content, seed length and width, but negatively correlated with seed thickness.

Husk content was negatively correlated with seed width and thickness and non-significantly positively correlated with seed length.

Seed length was non-significantly positively correlated with seed width and thickness. Seed width and thickness were highly significantly positively correlated.

The path coefficient analysis offerred a clearer picture of the effects of individual independent variables on seed yield.

Days to flower, number of leaves per plant, husk content, and seed width exhibited a negative direct effect on seed yield per plant. The other traits, i.e., plant height, seed length and thickness displayed a positive direct effect. Plant height had the highest positive direct effect on seed yield which is in agreement with the simple correlation coefficient between the two traits.

Negative direct effects of number of leaves per plant and seed width could not be perceived from the simple correlation coefficients because they were masked by positive indirect effects via plant height and seed length in the case of the former trait and via days to flower, plant height, husk content, seed length and thickness in the case of the latter trait.

The obtained value of determination coefficient (R^2 = Ø.56) indicates that about 56% of the total variability of the dependent variable (seed yield) may be accounted for by the effects of the examined independent variables whereas the remaining 44% should be attributed to the effect of other factors.