

**ASSESSMENT OF THE AGRONOMIC AND INDUSTRIAL VALUE  
OF SUNFLOWER VARIETIES EXPRESSED BY AN OVER-ALL  
ECONOMIC INDEX**

ZS. BAKOS  
(Hungary)

Objective judgement of the relative economic value of varieties (hybrids or true-breeds) is complicated by the fact that characters of very different kind have to be compared and estimated.

The method developed by Tomcsány (1957, 1965), modified and extended to field crops by Sváb (1960, 1971) offering the possibility to express the economic value of a variety by one single economic index, seems practicable for the disposal of this difficulty.

In the essence the method consists in transforming the observed values of different agronomic and technical characters on a common scale, giving each character a weighting coefficient according to the actual economic value of the given character, and finally multiplying the yield per area with the algebraic product of all these weighting coefficients. By this method,

1. all characters, however different in kind, can be jointly considered;
2. including at any time further characters or excluding any character involved, does not influence the economic weight of the other characters;
3. in case of changes in quality requirements, or technical advance etc. the economic weight of a given character may be modified individually, without influence on the economic weight of the other characters considered.

The common scale ranges from 0 to 1.0. Figure 1.0 (= 100 per cent) indicates the level of the given character taken for optimal at that time. Nil is the lowest value of the scale, there never can be a negative value. Values greater than 1.0 are possible, however, indicating that the observed value of the given character surpasses the level known as optimal at that time.

The relation between the observed level of any character considered and the weighting coefficient expressing its economic weight is given by a linear equation or by graphical representation. Thus, for any level of a given character the weighting coefficient can be calculated by substitution.

For the practical adaptation of this method to sunflower varieties first of all the range of those agronomic and technical characters had to be appointed, which decisively influence the economic value of a given variety. This specification has done in co-operation with a technical committee, comprising biometricians as well as experts of agricultural and industrial production. The committee established the following characters :

1. Grain yield, q/ha
2. Oil content, per cent
3. Uniformity of plant height (standard deviation, cm)
4. Plant height, cm
5. Lodging (scored)
6. Length of vegetation period, days.

The economic weighting coefficients for these characters have been estimated as follows :

1. Grain yield, q/ha (adjusted to 10 per cent moisture content)
2. Oil content, per cent (related to absolute dry matter content)

$$Y = -1.5 + 0.05 x$$

x	y
54 per cent	1.20
50 per cent	1.00
48 per cent	0.80
42 per cent	0.60
38 per cent	0.40

3. Uniformity of plant height (standard deviation, cm).

$$Y = 1.7 - 0.05 x$$

x	y
10	1.2
12	1.1
14	1.0
16	0.9
18	0.8
20	0.7

4. Plant height, cm

$$Y = 1.8 - 0.005 x$$

x	y
131—150	1.10
151—170	1.00
171—190	0.90
191—210	0.80
211—230	0.70

5. Lodging (scores)

	x	y
no lodging	= (5)	1.0
slight lodging	= (4)	0.9
medium lodging	= (3)	0.7
severe lodging	= (2)	0.4

6. Length of vegetation period, days

	x	y
	105—111	1.00
	112—118	0.95
	119—125	0.90
	126—132	0.85
	133—139	0.75
	more than 140	0.60

An example of the actual application of the method is presented on the data of the national sunflower variety trials of the year 1973, conducted in 8 experimental locations. Table 1 shows the observed data with the relating economic weighting coefficients, and the over-all economic index expressed in q/ha and also in per cent of the standard. The comparison involves two Romanian hybrids (Romsun 52 and Romsun 53), and two Soviet varieties, Chakinskij 269 and Peredovik (= standard).

The analysis with this method, expressing the influence of single characters on the global economic value of the variety considered, may give the plant breeder useful indications as to which of these characters need or merit further improvement.

Table 1

Results of the national sunflower variety trials, 1973

Variety	1	2	3	4	5	6	2-6	1-6	
	Grain yield, q/ha	Oil content, per cent	Uniformity of plant height, %	Plant height, cm	Lodging, (scored)	Length of vegetation period, days	Global qualitative value	Economic value expressed in	
								q/ha	per cent of the standard
Observation data									
Romsun 52	34.8	48.0	14.2	189	5	122			
Romsun 53	32.0	48.0	14.9	196	5	122			
Chakinskij 269	25.2	50.0	15.5	172	4	120			
Peredovik	33.0	50.0	18.3	206	4	123			
Weighting coefficients									
	1	2	3	4	5	6	2-6	1-6	
Romsun 52	34.8	0.90	0.99	0.90	1.00	0.90	0.72	25.0	151.5
Romsun 53	32.0	0.90	0.96	0.80	1.00	0.90	0.62	19.8	120.0
Chakinskij 269	25.2	1.00	0.93	0.90	0.90	0.90	0.68	17.1	103.6
Peredovik	33.0	1.00	0.78	0.80	0.90	0.90	0.50	16.5	100.0

This method proved efficiently to promote objective judgements on the real and over-all economic value of given varieties or hybrids on application for release into the commercial production.

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