

Tab. 2.

The grading list of Cv 'Rosabunda'

| Nr. | Traits and properties | Points possible | Average number of points obtained | | | Average 1976-1977 |
|-------|----------------------------------|-----------------|-----------------------------------|------|------|-------------------|
| | | | 1976 | 1977 | 1978 | |
| 1. | The shape of bush | 5 | 4.0 | 4.0 | 4.0 | 4.0 |
| 2. | Vigour | 10 | 8.8 | 8.7 | 8.0 | 8.5 |
| 3. | Foliage | 10 | 9.0 | 9.0 | 9.0 | 9.0 |
| 4. | Resistance to disease | 8 | 7.6 | 8.0 | 7.8 | 7.8 |
| 5. | Stem and flower-bearing peduncle | 5 | 4.5 | 5.0 | 5.0 | 4.8 |
| 6. | Intensity in flowering | 10 | 6.0 | 7.6 | 7.5 | 7.0 |
| 7. | Inflorescence | 5 | 4.0 | 5.0 | 3.8 | 4.3 |
| 8. | Bud shape | 5 | 4.2 | 4.0 | 4.8 | 4.3 |
| 9. | The shape of flower when open | 9 | 7.1 | 8.0 | 8.0 | 7.7 |
| 10. | Flower life | 9 | 5.7 | 5.7 | 5.8 | 5.7 |
| 11. | Petal falling | 5 | 4.0 | 4.0 | 3.5 | 3.8 |
| 12. | Colour at flowering | 6 | 5.1 | 5.7 | 6.0 | 5.6 |
| 13. | Colour at opening | 6 | 6.0 | 6.0 | 6.0 | 6.0 |
| 14. | Odour | 7 | 4.2 | 5.2 | 4.6 | 4.7 |
| Total | | 100 | 80.2 | 83.2 | 83.8 | 85.9 |

florescence comprises 3-13 flowers, with a pleasant odour of average intensity.

The decorating value has been determined by means of grading, in 1976-1978 (Tab. 2) when it obtained an average number of points of 83.2, from 100 possible.

This new variety fits well for decorating parks and allows for plantation on lawns or smaller group of beds.

VARIABILITY OF THE CHLOROPHYLL CONTENT IN
 WHITE CLOVER (*TRIFOLIUM REPENS* L.)

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Abstract:

PUJA I., SZABÓ T.A., ILLYES Gh., 1981, Variability of the chlorophyll content in white clover (*Trifolium repens* L.). Not. Bot. Hort. Agrobot. Cluj, XI., 9 - 15. White clover cultivars from the "giganteum", "intermedium" and "nanum" cultivar groups have been tested for the variability of chlorophyll content in leaflets according to Mackinney spectrophotometric method. The chlorophyll content (a, b, a+b, a/b mg/100 mgDM) was studied in relation to certain morphological characteristics of the leaflets (length, width, surface, weight, weight/surface). The method seems to be useful for the screening of strains for high chlorophyll content. Cultivars from the nanum group had generally lower values; calculated for the dry weight of the assimilatory tissue under the same leaf surface this tendency disappears.

Index words: *Trifolium repens*, variability, cultivars; chlorophyll a, b;

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Variability of the chlorophyll content (a and b) by different cultivars of *Trifolium repens* L. may be of considerable importance for

a better understanding of the function of the 1st, and 2nd photosystem by this species. In the available references no data regarding the variability of this characteristics have been found (2, 3, 4, 7, 10). The problem is important not only from theoretical but also from practical point of view, because there is a positive correlation between the photosynthetic capacity production and symbiotic nitrogen fixation in some cultivated Fabaceae (1, 5, 8, 11).

Material and method

Thirteen cultivars from "giganteum", "intermedium" and "nanum" cultivar groups have been sampled from the collection of our Agrobotanic Garden containing 102 cultivated and spontaneous white clover populations. The samples were collected in september in three repetitions, the repetitions homogenized leaflets separated and analyzed biochemically or morphologically. Chlorophyll extractions was performed according to MACKINNEY spectrophotometric method (6, 9), extraction was effectuated in situ with acetone 80%, data calculated from the extinctions at 663 nm and 645 nm respectively registered by a Spe-cord spectrophotometer (VEB Carl Zeiss Jena). The following formula have been used: chlorophyll a = $12,7 E_{663} - 2,69 E_{645}$; chlorophyll b = $22,9 E_{645} - 4,68 E_{663}$ (mg/100 ml, results reported for dry matter).

Biometric measurements were performed on 60-90 pressed and air dried leaflets, the assimilatory surface was measured directly on millimetric paper and indirectly by cutting the leaflets from a homogeneous piece of paper with known weight and surface.

Results and discussion

The variability of the measured characters was calculated for cultivar groups and cultivars respectively (Tab. 1, 2, 3).

The leaflets of the cultivars from the giganteum group are about twice as large as that from the nanum group and cultivars from the intermedium group have really an intermediate position (Fig. 1, Tab. 1). The mean values computed for the whole set of 13 cultivars are much more closed to the values registered for giganteum group.

The assimilatory surface of a leaflet in the case of giganteum cultivars is about four time greater, than the leaflet-surface of nanum cultivars. Similar values have been registered in the case of leaflet weight. Both methods used for the measurement of the assimilato-

Tab. 1.

Variability of some characters analyzed in the three main cultivar groups of white clover (Trifolium repens L.)

| Characters | Symbols | Cultivar groups | | | |
|---|----------------|-----------------|-------------|--------|-----------|
| | | giganteum | intermedium | nanum | \bar{x} |
| Chlorophyll (mg/100mg DM) | a | 10.45 | 10.24 | 9.78 | 10.15 |
| | b | 5.25 | 5.18 | 4.81 | 5.08 |
| | a+b | 15.68 | 15.42 | 14.58 | 15.23 |
| | a/b | 1.99 | 1.98 | 2.04 | 2.00 |
| Leaflet characters | | | | | |
| - Length (mm) | L | 21.81 | 15.92 | 10.80 | 16.18 |
| - Width (mm) | l | 18.76 | 13.88 | 9.55 | 14.06 |
| - Length x width | Lx1 | 410.51 | 221.46 | 106.08 | 246.02 |
| - Measured surface (mm ²) | S ₁ | 295.35 | 156.70 | 73.15 | 175.07 |
| - Calculated surface | S ₂ | 286.16 | 146.08 | 71.70 | 167.98 |
| - Dry weight (mg) | G | 7.25 | 3.74 | 1.95 | 4.31 |
| - weight of 100 cm ² (mg, DM) | G/S | 247 | 238 | 247 | 244 |

ry surface of the leaflets gave similar results, but the values registered indirectly were consequently greater about 4%.

The dry matter content of the leaves calculated for 100 cm² assimilatory surface is slightly higher in small leaved cultivars (267 mg) than in large-leaved ones (246 mg).

The amount of extracted chlorophyll, both a and b were smaller in the case of cultivars from the nanum group: this may be influenced, probably by the relative differences in the amount of protective tissues in different variety groups, too.

The chlorophyll content existing under 100 cm² assimilatory surface (leaflets) was determined using the following formula:

$$C_u = G/S \cdot C_m$$

where C_u = chlorophyll content in mg under 100 cm² assimilatory sur-

TRIFOLIUM REPENS L.

1. TAMAR

2. MAJOR

3. OLVEN

4. TRIVISE

5. SZARVASI

6. LAUCLAIR

7. MECKLENBURGER

8. PREDKARPATSKIJ

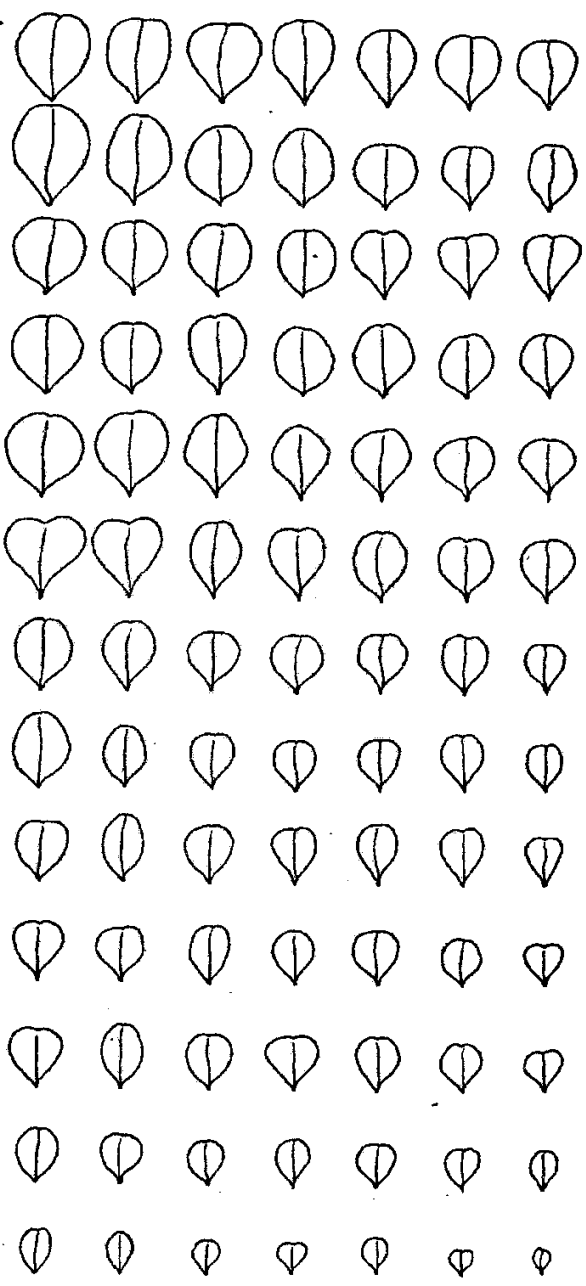
9. JYGEVA

10. MILKA FAJBERG

11. S-100

12. SKULTUNA

13. S-184



Tab. 3.

VARIABILITY OF SOME LEAF CHARACTERS IN SAMPLED TRIFOLIUM REPENS CULTIVARS:

| Nr. Code | Cultivar groups and cultivars | | | | | | | | | | | | | |
|-------------------|-------------------------------|--------|--------|----------------------|--------|--------|--------|--------|--------|--------|----------------|--------|-------|-----------|
| | A. Giganteum group | | | B. Intermedium group | | | | | | | C. Nanum group | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | \bar{x} |
| 1. a | 9.40 | 11.65 | 10.58 | 11.25 | 10.41 | 9.35 | 10.68 | 10.73 | 9.27 | 10.42 | 10.08 | 10.00 | 9.56 | 10.26 |
| 2. b | 4.65 | 6.19 | 5.25 | 5.70 | 5.04 | 4.65 | 5.23 | 5.49 | 4.71 | 5.44 | 5.04 | 4.95 | 4.67 | 5.15 |
| 3. a + b | 14.05 | 17.84 | 15.83 | 16.95 | 15.45 | 14.00 | 15.91 | 16.24 | 13.98 | 15.86 | 15.12 | 14.95 | 14.23 | 15.41 |
| 4. a/b | 2.02 | 1.88 | 2.01 | 1.97 | 2.06 | 2.01 | 2.04 | 1.99 | 1.97 | 1.92 | 2.00 | 2.02 | 2.05 | 1.99 |
| 5. L | 23.90 | 23.90 | 20.40 | 20.70 | 22.40 | 19.60 | 17.30 | 15.90 | 16.60 | 14.90 | 14.90 | 12.70 | 8.90 | 17.85 |
| 6. l | 19.90 | 19.40 | 19.00 | 17.30 | 18.90 | 18.10 | 15.30 | 13.40 | 13.60 | 13.70 | 13.40 | 11.10 | 8.00 | 15.47 |
| 7. L x l | 475.61 | 463.66 | 387.60 | 358.11 | 423.36 | 354.76 | 264.69 | 213.06 | 225.76 | 204.13 | 199.66 | 140.97 | 71.20 | 290.97 |
| 8. B ₁ | 337.90 | 333.80 | 280.70 | 271.40 | 286.90 | 261.40 | 180.00 | 162.10 | 160.00 | 137.10 | 144.30 | 96.30 | 50.00 | 207.84 |
| 9. B ₂ | 311.50 | 314.40 | 277.40 | 295.90 | 272.80 | 245.00 | 180.30 | 143.30 | 143.30 | 124.80 | 138.70 | 92.50 | 50.90 | 199.29 |
| 10. G | 7.93 | 5.93 | 8.00 | 7.12 | 7.27 | 7.28 | 3.86 | 6.10 | 3.67 | 2.72 | 2.37 | 2.97 | 0.93 | 4.92 |
| 11. (G/S)100 | 2.35 | 1.78 | 2.85 | 2.62 | 2.53 | 2.78 | 2.14 | 3.76 | 2.29 | 2.00 | 1.64 | 3.08 | 1.86 | 2.42 |
| 12. % DM | 21.5 | 24.9 | 24.0 | 24.9 | 24.2 | 26.3 | 24.9 | 25.5 | 27.2 | 26.1 | 25.0 | 27.7 | 30.0 | 25.55 |

Notes: Code symbols similar as in Table 1.

Cultivar groups and cultivars: A. Giganteum group: 1. "Tamar", 2. "Major", 3. "Olven", 4. "Trivise",

5. "Szarvasi", 6. "Lauclair"

B. Intermedium group: 7. "Mecklenburger", 8. "Predkarpatski", 9. "Jygeva", 10. "Milka Fajberg", 11. "S-100",

C. Nanum (sylvestre) group: 12. "Skultuna", 13. "S-184".

Tab. 2.

Variability of the a and b chlorophyll content among main cultivar groups, calculated for the same assimilating surface (C_u).

| Chlorophyll (mg) | Cultivar groups | | | |
|------------------|-----------------|-------------|-------|-----------|
| | giganteum | intermedium | nanum | \bar{x} |
| a | 25.81 | 24.37 | 24.15 | 24.78 |
| b | 12.96 | 12.33 | 11.88 | 12.39 |
| a+b | 38.77 | 36.70 | 36.03 | 37.17 |
| a/b | 1.99 | 1.97 | 2.03 | 2.00 |

face; G/S = dry matter of 100 cm² leaflets, C_m = chlorophyll content in mg/100 mg dry matter. The relative amount of the chlorophyll under the same assimilatory surface is presented in table 2.

In the case of examined cultivars the chlorophyll content (Table 3) varied in the case of chlorophyll a between 11.65 mg/100 mg DM (cv. 'Major') and 9.27 (cv. 'Jygeva').

In the case of chlorophyll b the extreme values were 6.19 (cv. 'Major') and 4.65 (cv. 'Luclair') respectively. The amount of a + b chlorophyll varied between 17.87 (cv. 'Major') and 14.00 (cv. 'Luclair'); the ratio between chlorophyll a : b between 2.7 (cv. 'Szarvasi') and 1.9 (cv. 'Major') respectively.

These results generally agree with the naked eye observations during cultivar evaluation. The most striking correlation was noticed in the case of cv. 'Luclair'; this cultivar possesses special genes from the allele series "V leaf mark" and was bred for park-lawns.

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