

Experiments on the cultivation of dandelion for salad use. II

The nutritive value and intrinsic quality of dandelion leaves

TAINA KUUSI,¹ KIRSTI HÅRDH² and HELENA KANON²

¹ *Technical Research Centre of Finland, Food Research Laboratory,
SF-02150 ESPOO 15, Finland*

² *Department of Horticulture, University of Helsinki,
SF-00710 HELSINKI 71, Finland*

Abstract. In an extensive investigation concerning the utilization of dandelion, the feasibility of cultivating the dandelion for salad use has been studied. Properties making up the intrinsic quality, viz., nutritive value and content of nitrates, have been used as one criterion of suitability. The study material consisted of 11 Finnish agamospecies selected for their mild taste, and two middle-European cultivars, 'Vollherziger verbesserter' and 'Vert de Montmagny'. The effects of cultivation methods were also studied: two levels of fertilization, and covering with black polyethylene film, black fibre cloth and bark humus layers of various thicknesses were compared. As criteria of the nutritive value, dry matter, soluble solids, mineral contents, in particular Ca, Mg, Fe and Mn, and vitamin C, were measured. The nitrate content as a criterion of intrinsic quality was also studied.

In spring, the dry matter of the rosettes averaged 12.3 %, in late summer 17.1 %. In spring the average content of soluble solids was 5.5 %, the mineral content 1.6 %. The amounts of the individually analyzed minerals Ca, Mg, Fe and Mn deviated somewhat from values in the literature, probably due to the methods of cultivation. The amount of vitamin C in spring was on average 42 mg/100 g, varying between 29 and 53 mg/100 g. The nitrate content was low: at highest 660 mg NO₃/kg fresh weight.

The influence of fertilizing level was slight. Even the levels of minerals and nitrates were not increased at the higher level of fertilization.

Coverings had clear-cut effects. Where the covering effectively eliminated light, i.e. when black film, black fibre cloth or thick bark humus layer was used, the dry matter, soluble solids, mineral content and vitamin C values were decreased and the nitrate values increased.

Compared with other plants used as salad greens, the nutritive value and particularly the amount of vitamin C in dandelion are much higher, although the values are considerably decreased if the leaves are bleached. If the mild tasting types studied here were cultivated, bleaching would not be necessary. The nitrate content in dandelion is generally low as compared with many other plants used as salad greens.

Introduction

The dandelion is a wild-growing plant which has long been collected for its food and therapeutic value. A Finnish working group has for several years now been investigating the possibility of its extended use, particularly the cultivation of mild-tasting types for use as a salad green. The main results of this part of the investigation are reported separately (see KUUSI et al 1984; KANON 1982). Here the nutritive value and some other properties making up the 'intrinsic quality' will be reported. Although information on the nutritive value of dandelion leaves can be found in various nutrition tables (TURPEINEN 1978; European Productivity Agency 1961; SOUCI et al. 1962), the influence of methods of cultivation on the nutritive value has not been reported. These questions have been explored here. Other results, e.g. the botanical-genetic investigations of the dandelion material (ROUSI et al. 1984) are being reported elsewhere.

The properties chosen to indicate the nutritive value and intrinsic quality properties were in part chemical, in part sensory. Chemical nutritive properties were the dry matter, soluble dry matter, vitamin C and mineral content. In addition, in a small series the contents of calcium, magnesium, iron and manganese were studied. Concerning the intrinsic quality, the amount of nitrate was assayed in a small series. The sensory properties, including the general evaluation as salad green and measure of bitterness, are reported in part I of this article (see KUUSI et al. 1984).

Material and methods

The material consisted of 11 Finnish mild-tasting agamospecies, chosen from 69 agamospecies for cultivation experiments on the basis of taste, vigour of growth and several other properties (see ROUSI et al. 1984, KUUSI et al. 1984, KANON 1982). Two commercial

varieties, 'Vollherziger, verbesserter' of Swiss origin and 'Vert de Montmagny' of French origin, were included for comparison. The list of the agamospecies and varieties is seen in the tables. Seeds were germinated in peat pots and grown in a glass-house for 6 weeks before being transferred to the open field at the end of May. The experimental design was the split plots method.

The properties of the different agamospecies and varieties were compared in a first experiment, and the influence of fertilization at 2 levels of application, using 'Vert de Montmagny', in a second. At the same time, the influence of various covering methods was investigated, with the alternatives being no covering, different thicknesses of bark humus, black polyethylene film and black fibre cloth. The details are given in part I of this article (KUUSI et al. 1984) and in the pro gradu-work of KANON (1982).

The quality analyses and evaluations were done in August of the first summer and the main investigations at harvest the following May and June.

The analytical methods were those regularly used in the Food Research Laboratory. Dry matter was obtained after drying at 100–105°C. Soluble solids were measured by refractometry (HORWITZ 1975) from extracts obtained as follows: leaves were washed and homogenized with a Bamix mixer, and the homogenates were kept frozen in gauze bags. After thawing, the juice was pressed out and the sediment allowed to settle to the bottom. The clear top liquid was taken for the measurement. Mineral content was assayed by ashing at 550°C (HORWITZ 1975), and acid-insoluble ash was also assayed when necessary (ANON. 1942). Ca, Mg, Fe and Mn were assayed from acid-soluble ash by atomic absorption spectrophotometry. Nitrates were assayed with an Orion 93—07 nitrate-specific electrode (ANON. 1977). Vitamin C was assayed from metaphosphoric acid extracts of the leaves colorimetrically by using Tillmann's reagent (FREED 1966). In some cases

the reductone correction was done, but dehydroascorbic acid was not taken into account.

Results

The analytical results are presented in Tables 1—6 for each property separately. First, the different agamospecies and varieties are compared for that property and then the influence of fertilization and covering is reported.

Table 1 shows the results for dry matter. It is seen that the average dry matter for all agamospecies and varieties in spring was 12.3 % when cultivation was in light and 7.4 % when cultivation was in darkness. In late summer the average in light was still higher, 17.1 %. In tables of the literature the values vary between 14 and 15 % (TURPEINEN 1978; ANON. 1961; SOUCI 1962), while for leaves of spring dandelion FRANKE and KENSBOCK (1981) give 13 and 15.7 %. The content of dry matter evidently depends on the growth phase of the leaves, and is lower in young spring leaves, which are best for salad use, than in the mature leaves of late summer. Darkness decreases the dry matter because photosynthesis is hindered. No clear differences were observed between the Finnish and the foreign dandelions.

The fertilizing level had no influence on the dry matter, but the method of covering was important: black film, black fibre cloth and thick bark humus covering decreased the dry matter due to the darkening effect and the thinner bark humus layer had no effect.

The results for soluble solids in Table 2 vary in a similar way to the dry matter with light/darkness and spring/late summer. In spring in light the average was 5.5 %, in darkness 3.8 %, and in late summer in light higher at 6.2 %. The average values of the foreign varieties were the highest of the series both in spring and in late summer, but many of the Finnish agamospecies had values at

the same level. In spring the soluble solids content was lowest in the small agamospecies *T. hjeltii*.

Comparison of these values with the literature is difficult, since the tables give only the calculated total carbohydrate. This varies between 7.5 and 8.6 % and is higher than the refractometric soluble solids give here.

The influence of fertilizing level on the soluble solids was only slight. Influence of co-

Table 1. Dry matter (per cent) in leaves of different dandelion agamospecies and varieties, and the effect of different methods of cultivation

Agamospecies or variety	Spring 1981		Summer 1980
	In light	In darkness	In light
<i>Taraxacum</i>			
<i>aculeatum</i>	12.9	7.3	16.0
<i>T. alatum</i>	11.7	6.8	14.8
<i>T. amplum</i>	13.3	7.6	17.2
<i>T. ancistrolobum</i>	11.5		15.5
<i>T. ekmanii</i>	11.8		17.3
<i>T. hemicyclum</i>	13.1		15.3
<i>T. hjeltii</i>	10.2		22.7
<i>T. pallidipes</i>	13.0		15.4
<i>T. piceatum</i>	13.1		18.2
<i>T. sublaeticolor</i>	13.2		18.4
<i>T. tanyphyllum</i>	12.3	8.4	17.1
'Vollherziger'	11.9	6.8	15.6
'Vert de Montmagny'	12.3	7.5	19.0
Averages:			
Finnish	12.4	7.5	17.1
Foreign	12.1	7.2	17.3
All	12.3	7.4	17.1

EFFECT OF DIFFERENT METHODS OF CULTIVATION (VARIETY 'VERT DE MONTMAGNY')

Covering	Fertilizing level	
	1 ×	2 ×
No covering	11.3	12.1
Bark humus 2.5 cm	13.0	12.7
— » — 5 cm	11.7	12.1
— » — 5 + 5 cm	9.5	8.9
Black film	6.6	6.4
— » — and bark humus 5 cm	7.7	8.8
Black fibre cloth	7.4	7.1
Average	9.6	9.7

Table 2. Soluble solids (per cent) in leaves of different dandelion agamospecies and varieties, and the effect of different methods of cultivation

SOLUBLE SOLIDS OF DIFFERENT AGAMOSPECIES AND VARIETIES

Agamospecies or variety	Spring 1981		Summer 1980
	In light	In darkness	In light
<i>Taraxacum</i>			
<i>aculeatum</i>	5.4	3.9	7.0
<i>T. alatum</i>	4.9	3.3	4.7
<i>T. amplum</i>	6.0	3.7	6.2
<i>T. ancistrolobum</i>	5.3		6.4
<i>T. ekmanii</i>	5.3		6.3
<i>T. hemicyclum</i>	5.7		6.3
<i>T. hjeltii</i>	3.8		5.7
<i>T. pallidipes</i>	5.8		6.5
<i>T. piceatum</i>	5.8		5.8
<i>T. sublaeticolor</i>	6.0		5.5
<i>T. tanyphyllum</i>	5.7	4.1	6.5
'Vollherziger'	6.3	3.6	6.9
'Vert de Montmagny'	5.8	4.0	6.5
Averages:			
Finnish	5.4	3.8	6.1
Foreign	6.1	3.8	6.7
All	5.5	3.8	6.2

EFFECT OF DIFFERENT METHODS OF CULTIVATION (VARIETY 'VERT DE MONTMAGNY')

Covering	Fertilizing level	
	1 ×	2 ×
No covering	5.1	5.3
Bark humus 2.5 cm	5.5	6.1
— » — 5 cm	5.6	6.0
— » — 5 + 5 cm	4.9	4.9
Black film	4.0	4.1
— » — and bark humus 5 cm	4.5	4.6
Black fibre cloth	4.3	4.5
Average	4.8	5.1

vering was similar to that for dry matter: effective darkening lessened the values at both levels of fertilization, but the thin bark humus layers had no effect.

The mineral contents are shown in Table 3. Again, in spring the average values were higher in light (1.60 %) than in darkness (0.87 %) and in late summer higher still

Table 3. Mineral content (per cent) of leaves in different dandelion agamospecies and varieties, and the effect of different methods of cultivation

MINERAL CONTENT OF DIFFERENT AGAMOSPECIES AND VARIETIES

Agamospecies or variety	Spring 1981		Summer 1980
	In light	In darkness	In light
<i>Taraxacum</i>			
<i>aculeatum</i>	1.80	0.83	1.85
<i>T. alatum</i>	1.73	0.79	1.68
<i>T. amplum</i>	1.79	0.94	2.33
<i>T. ancistrolobum</i>	1.36		1.82
<i>T. ekmanii</i>	1.64		2.24
<i>T. hemicyclum</i>	1.62		1.85
<i>T. hjeltii</i>	1.71		3.19
<i>T. pallidipes</i>	1.40		1.89
<i>T. piceatum</i>	1.58		2.33
<i>T. sublaeticolor</i>	1.61		2.30
<i>T. tanyphyllum</i>	1.58	1.00	2.05
'Vollherziger'	1.44	0.74	1.78
'Vert de Montmagny'	1.57	0.90	2.15
Averages:			
Finnish	1.62	0.89	2.14
Foreign	1.52	0.82	1.97
All	1.60	0.87	2.11

EFFECT OF DIFFERENT METHODS OF CULTIVATION (VARIETY 'VERT DE MONTMAGNY')

Covering	Fertilizing level	
	1 ×	2 ×
No covering	1.39	1.41
Bark humus 2.5 cm	1.60	1.49
— » — 5 cm	1.37	1.45
— » — 5 + 5 cm	1.04	0.89
Black film	0.65	0.61
— » — and bark humus 5 cm	0.76	0.88
Black fibre cloth	0.84	0.74
Average	1.09	1.07

(2.11 %). The values of the Finnish dandelions were somewhat higher than the foreign ones in each series. The literature value of 2 % is between the spring and summer values obtained here.

The mineral content responded to fertilization and covering in the same way as the dry matter: the higher level of fertilizing had no

effect, effective covering decreased the content, and the thin bark humus layers had no effect.

The contents of Ca, Mg, Fe and Mn determined in one Finnish agamospecies and one foreign variety and shown in Table 4 are in good agreement. Relative to the literature (SOUCI 1962) values for Ca, 150–190 mg/100 g, the values obtained here, 182–195 mg/100 g, are at the upper limit. Conversely, for Mg the literature gives 36 mg/100 g, and our values of 29 mg/100 g are somewhat low. The differences may be due to the cultivation methods, particularly the addition of lime to the acid soils of Finland. For Fe, the tables give 3.0–3.1 mg/100 g, and thus the values of 9–14 mg/100 g obtained here are considerably higher. The high content of iron in the irrigation water may have been a contributing factor. For Mn, Souci's earlier value of 58 mg/100 g was obviously erroneous and it has since been corrected (1981/82) to 0.34 mg/100 g. The values obtained here, 0.58–0.68 mg/100 g, are at the same level as this.

The nitrate contents are seen in Table 5. Because it was assumed that dandelion does not accumulate nitrates, analyses were performed on only a few random samples. The values varied between 80 and 660 mg NO₃/kg fresh weight, which is a comparatively low level. No clear differences were found between the different agamospecies and varieties. Darkening caused a rise in the nitrate values, as expected (e.g. MENGEL 1979). Values for comparison have not been found in the literature.

The fertilizing level had no consistent effect on the nitrate content in this restricted series. Covering increased the content, as darkening did in the above series.

Table 4. Contents of selected metals in dandelion leaves (mg/100 g)

Agamospecies or variety	Ca	Mg	Fe	Mn
<i>Taraxacum piceatum</i>	195	29.0	14	0.58
'Vert de Montmagny'	182	28.5	9	0.68

Vitamin C results are given in Table 6. To simplify the table, the values of vitamin C after formalin correction have been omitted, although such analyses were done in the later summer series. The difference between the total and corrected vitamin C was small: the average total vitamin C in 13 samples was 20.0 mg/100 g, while the corresponding corrected value was 18.2 mg/100 g. The difference was maximally 4 mg/100 g. Accordingly, in all later analyses, separate assay for corrected vitamin C was considered unnecessary.

The average spring values in light were 42 mg/100 g with a range of 29–53 mg/100 g, and in darkness 14 mg/100 g, ranging from 11 to 16 mg/100 g. Cultivation in darkness

Table 5. Nitrate content (mg NO₃/kg fresh weight) of dandelion leaves in different agamospecies and varieties, and the effect of different methods of cultivation

NITRATE CONTENT OF DIFFERENT AGAMOSPECIES AND VARIETIES

Agamospecies or variety	Spring 1981		Summer 1980
	In light	In darkness	In light
<i>Taraxacum amplum</i>	130	660	90
<i>T. hemicyclum</i>	80	260	610
<i>T. hjeltii</i>			200
<i>T. sublaeticolor</i>	90	180	270
<i>T. tanyphyllum</i>			300
'Vollherziger'			120
'Vert de Montmagny'			480
Averages:			
Finnish	100	367	294
Foreign			296
All	100	367	296

EFFECT OF DIFFERENT METHODS OF CULTIVATION (VARIETY 'VERT DE MONTMAGNY')

Covering	Fertilizing level	
	1 ×	2 ×
No covering	100	160
Bark humus 5 + 5 cm	370	660
Black film	520	150
Average	330	323

Table 6. Total vitamin C contents (mg/100 g) of leaves of different dandelion agamospecies and varieties, and the effect of different methods of cultivation

VITAMIN C CONTENT OF DIFFERENT AGAMOSPECIES AND VARIETIES

Agamospecies or variety	Spring 1981		Summer 1980
	In light	In darkness	In light
<i>Taraxacum</i>			
<i>aculeatum</i>	46	13	19
<i>T. alatum</i>	47	15	21
<i>T. amplum</i>	53	16	18
<i>T. ancistrolobum</i>	44		18
<i>T. ekmanii</i>	42		26
<i>T. hemicyclum</i>	35		17
<i>T. hjeltii</i>	33		17
<i>T. pallidipes</i>	43		7
<i>T. piceatum</i>	48		26
<i>T. sublaeticolor</i>	37		23
<i>T. tanyphyllum</i>	29	11	19
'Vollherziger'	49	14	24
'Vert de Montmagny'	41	13	25
Averages:			
Finnish	42	14	19
Foreign	45	14	25
All	42	14	20

EFFECT OF DIFFERENT METHODS OF CULTIVATION (VARIETY 'VERT DE MONTMAGNY')

Covering	Fertilizing level	
	1 ×	2 ×
No covering	35	52
Bark humus 2.5 cm	36	48
— » — 5 cm	42	49
— » — 5 + 5 cm	26	5
Black film	8	10
— » — and bark humus 5 cm	18	19
Black fibre cloth	11	10
Average	25	28

thus considerably decreased the ascorbic acid content. In late summer the average was 20 mg/100 g and range 7—26 mg/100 g. Although the average values of the foreign dandelions were slightly higher than those of the Finnish agamospecies, the values of some of the latter were fully comparable or even higher.

The influence of the level of fertilizing was slight on the average. Where enough light was available (no covering and thin bark humus layer), the higher level increased the vitamin C content. If the covering caused effective darkening, the content was strongly decreased.

According to literature tables, vitamin C content in dandelion leaves varies between 5 and 40 mg/100 g. In Finland, SIMOLA (1945) found 49 mg/100 g and ERKAMA (1946) 73 mg/100 g. Recent values from Germany (FRANKE and KENSBOCK 1981) vary between 51 and 110 mg/100 g, and if dehydroascorbic acid is taken into account, between 74 and 137 mg/100 g. The amount is much lower in the leaf nerve than the lamina, the former value being 15—31 mg/100 g, the latter 93—159 mg/100 g, without dehydroascorbic acid. The German values are high in comparison with other literature values and also the present values, which may depend on the analytical method used.

Discussion

As the main conclusions concerning each property have already been drawn, we turn here to a more general discussion of the nutritive value and intrinsic quality of dandelion leaves.

According to the tables of the literature, the nutritive value of dandelion leaves is high compared with cultivated lettuce. As the dry matter value of the dandelion leaves is 2—3 times higher, the values of the different nutritive components are quite naturally higher. The present results are in basic agreement with the values in the literature, but go farther in indicating the effect of different cultivation methods. It is not specified in the literature tables whether the analyses concern wild or cultivated dandelions, but since cultivation is uncommon it may be assumed that they were wild. High vitamin C values have been reported for leaves of wild dandelions (FRANKE and KENSBOCK 1981, ERKAMA 1946). Cultivation may to some degree change the

nutritive values, and vitamin C content may indeed be higher in the wild plant. Correspondingly, the slightly higher values found here for calcium and iron and lower values for magnesium may be related to the addition of lime and use of irrigation water containing iron.

The nutrient level of the dandelion leaves is high, partly because of the high dry matter content. This alone is not a decisive criterion of quality, however. The dry matter content of leaves is highest in late summer, but the vitamin C content is then lower and the sensory quality poorer than in the spring. Like dry matter, soluble solids and mineral content are high in late summer, but also the nitrate content tends to be higher. Here the decisive properties for usefulness are the sensory properties and vitamin C content.

Darkness had the effect of decreasing the values of vitamin C as well as dry matter, soluble solids and mineral content, but increased the nitrate values. The sensory properties were improved by darkness.

Compared with other salad greens, such as lettuce and Chinese cabbage, dandelion leaves show definitely higher nutrient contents. The main difficulty with dandelion leaves picked wild is the bitter taste, which varies in an apparently random way among different individuals. The results obtained here based on the comparatively mild-tasting agamospecies selected for cultivation indicate that strong bitter taste and high value of vitamin C are connected. If dandelions are grown in darkness, both bitterness and content of vitamin C are decreased. Thus, a compromise is necessary to obtain an acceptable low level of bitterness together with as high vitamin C content as possible. In the present agamospecies the bitterness was in general so slight that cultivation in darkness is not essential. However, such cultivation also has the favourable effect of producing a crisp texture.

A choice may thus have to be made between light green rosettes with higher vitamin C content and a texture like soft lettuce

leaves, and bleached rosettes with lower vitamin C content and crisp texture like iceberg lettuce. In both cases the bitterness is barely noticeable. Dandelion leaves collected wild in spring have high vitamin C content, but because of the bitterness they are best used together with other, mild-tasting salad vegetables.

One positive feature of dandelion leaves compared with other salad greens is that dandelion does not accumulate nitrates. Although the nitrate content increases if cultivation takes place in darkness, even then the level is only ca. 600 mg nitrate/kg fresh weight. In contrast, our investigations (KUUSI, VIRTANEN and KLEEMOLA 1980) showed a level of 3000 mg/kg in lettuce heads, and in November as much as ca. 4500 mg/kg. Correspondingly, LIUKKONEN and other (1976) obtained for lettuce values between 2000 and 5200 mg/kg. Values were also high for Chinese cabbage, between 750 and 6660 mg/kg (KUUSI and HAUTALA, unpublished). In this respect, then, dandelion leaves are superior to other salad greens.

Other properties making up the 'intrinsic quality' are contents of harmful substances such as residues of heavy metals and pesticides. Though these have not been investigated here, it is known from the literature that if dandelions grow near heavily trafficked roads, they pick up lead from engine exhausts (HANEY, CARLSON and ROLFE 1974). In parks in Cracow dandelions were found to accumulate cadmium, lead and iron, emitted by a near-by steel plant (GRODZINSKA and KAZMIERCZAKOWA 1977). In Japan a local species, *Taraxacum japonicum*, was shown to pick up cadmium in the neighbourhood of an old mine (NARITA and others, 1976). As regards pesticides, their use in dandelion cultivation may in general be unnecessary, since dandelion seems to be relatively resistant against insects and plant diseases. If such pests do appear, they will probably do so in late summer, whereas the crop of young rosettes will be harvested the following spring. Dandelion seems to be resistant against many

herbicides. Where herbicides effective against dandelion have been used however, collecting of dandelions would not be recommended. In such cases the growth of dandelions would be anomalous, and pickers would probably discard such individuals.

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Voikukan lehtien ravintoarvo ja sisäinen laatu

Taina Kuusi¹, Kirsti Hårdh² ja Helena Kanon²

¹ Valtion teknillinen tutkimuskeskus, Elintarvikelaboratorio, SF-02150 Espoo 15

² Puutarhatieteen laitos, Helsingin yliopisto, SF-00710 Helsinki 71

Voikukan hyötykäyttöä koskevassa tutkimuksessa on selvitetty voikukan viljelymahdollisuuksia salaattina käytettäväksi. Tässä yhteydessä on eräänä kriteerinä käytetty sisäiseen laatuun kuuluvia ominaisuuksia kuten ravintoarvoa sekä nitraattipitoisuutta. Tutkimuksessa on verrattu keskenään 11 kotimaista miedon makuista pikkulajia sekä kahta keskieuropalaista salaattivoikukkakantaa, 'Vollherziger, verbesserter' ja 'Vert de Montmagny'. Lisäksi on tutkittu viljelymenetelmien vaikutusta, niin että lannoitusta kokeiltiin kahdella tasolla, ja ruusukkeiden vaalentamiseksi käytettiin erilaisia katteita kuten mustaa muovikalvoa, kuitukangasta ja eri paksuisia kuorihumuskatteita. Ravintoarvon kriteereinä olivat kuiva-aine, liukoinen kuiva-aine, kivennäisainepitoisuus sekä erikseen Ca-, Mg-, Fe- ja Mn-määrät, nitraatti sekä C-vitamiini.

Salaattivoikukan kuiva-aineen todettiin kevätsadossa olevan keskimäärin 12.3 %, loppukesällä jopa 17.1 %. Liukoinen kuiva-aine oli keväällä keskimäärin 5.5 % ja kivennäisainepitoisuus 1.6 %. Nitraatin määrä oli alhai-

nen, korkeimmillaan 660 mg NO₃/kg tuorepainoa. C-vitamiinin määrä oli kevätsadossa keskimäärin 42 mg/100 g ja vaihteli rajoissa 29–53 mg/100 g.

Tutkittujen kivennäisaineiden, Ca, Mg, Fe ja Mn, määrät poikkesivat jossakin määrin kirjallisuuden arvoista johtuen otaksuttavasti viljelyn vaikutuksista.

Lannoitustason vaikutus on ollut vain vähäinen. Korkeampi lannoitustaso ei ole kohottanut edes kivennäisaineiden eikä nitraatin määriä.

Katteiden vaikutuksesta voitiin todeta, että silloin kun kattaminen oli tehokkaasti vähentänyt valon saantia (muovi- ja kuitukangaskate sekä paksuin kuorihumuskate), olivat kuiva-aineen, liukaisen kuiva-aineen ja C-vitamiinin arvot alentuneet ja nitraattimäärä kohonnut.

Voikukkasalaatin etuina muihin salaattina käytettyihin kasveihin verrattaessa on korkea ravinnepitoisuus, erityisesti C-vitamiinin korkea taso, joka tosin vaalenettaessa melkoisesti alenee. Tutkittuja mietoja voikukkakantoja viljeltäessä vaalentaminen ei ole välttämätöntä.