

ON THE SUSCEPTIBILITY OF THE DIFFERENT VARIETIES OF BIG-LEAFED TURNIP TO DAMAGE CAUSED BY CABBAGE MAGGOTS (*Hylemyia* spp.)

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The cabbage root fly (*Hylemyia brassicae* Bouché) and the turnip root fly (*Hylemyia floralis* Fall.) are the most important pests occurring in the crucifers in Finland. The larvae live in the underground parts of the plants burrowing channels in them and often causing considerable losses in yield. The abundance and severity of damage varies in different years, as well as in different species and varieties.

According to inquiries instituted in Sweden (1), the early varieties of the turnip were attacked more severely than the late ones, likewise the round ones more than the long ones. According to MORISON (2), the hard varieties of the turnip and swede became less damaged than the soft ones. This is due to the ability of the former better to resist the aftereffect of affect, for the calculations done on the amounts of the pupae on the surface of the hard and the soft varieties have shown that the numbers are approximately equal. REICHELT (3) has on the basis of his investigations on red cabbage, concluded that susceptibility is not a characteristic of any specific variety, for although the distinct differences between the different varieties can be noted in a year their order varies to a notable degree in different years. SALONEN (4) states that according to his observations at Inari (lat. 69°5' N) the roundish big-leaved turnips with dense foliage are distinctly more resistant against damage caused by the cabbage maggots than the flatround ones, as the root of the first is stouter and more amply branching. The larvae can easily cut through the thin root of the flat-round turnip and the plant withers.

In the years 1951—1955 the damage caused by the cabbage maggots to the different varieties of big-leaved turnip (*Brassica rapa* L. v. *rapifera* Metzg.) was studied at Tikkurila (lat. 60°20' N and long. 25°30' E). The examinations were made on the varieties used in the field tests at the Agricultural Research Centre, Department of Plant Husbandry. A total of 200 turnips of each variety was examined. The varieties used in tests for several years will be examined first. The following varieties of big-leaved turnip were in general cultivation:

1. the so called «Native» big-leaved turnip, purple topped, strap-leaved, and flat, from Holland (A. R. Zwaan & Sohn, Voorburg), the seed of the variety is cultivated in Finland.
2. the White Dutch, strap-leaved and flat, from the same firm as the former.
3. the Green Globe, green topped, roundish and lobate from England (Charles Sharpe & Co., Sleaford).

The damage suffered by these varieties during 1951—1955 is presented in Table 1. The number of damaged roots is given in percentages. The average extent of damage is also mentioned.

The damage varied considerably in different varieties during different years. For that reason no conclusions on the susceptibility of a variety to damage could be drawn on the basis of results of examinations obtained in one single year. The «Native» big-leafed turnip became damaged most severely in the years of investigation (the percentage of damage was 89 while the average of damage of all varieties was 80). For a period of two years the variety Sirius tetrapl. Svalöv was included in the test. This variety suffered distinctly slighter damage than the other varieties mentioned above (in 1954 the percentage of damage was 82 and the average of damage 1.6, in 1955 the corresponding numbers were 65 and 0.9).

In the second variety test, in which the «Native» big-leafed turnip also was used as the standard, the following varieties were included in 1952—1955:

1. the «Natives» big-leafed turnip.
2. Sirius Riesen, green-topped, round and lobate, from Holland (A. R. Zwaan & Sohn, Voorburg).
3. Zwaans Brabo, purple-topped, fairly long, and strap-leaved, from the same firm as No. 2.
4. Zwaans Favoriet, purple-topped, fairly long, and lobate, from the same firm as the above.
5. Gelria, purple-topped, fairly long, and strap-leaved, from Holland (N. V. Sluis en Groot's, Enkhuizen).
6. Lincolnshire Red Globe, purple-topped, long-round, and lobate, from England (Hurst & Son Ltd., London).
7. Purple Top Mammoth, form and origin as No. 6.

The damage to these species in different years is presented in Table 1.

Table 1. Damage caused by cabbage maggots (*Hylemyia* spp) to the different varieties of the big-leafed turnip at Tikkurila in the years 1951—55. Scale: 0 = fully healthy, 5 = fully damaged.

Variety	1951		1952		1953		1954		1955		Average	
	Percentage	Average	Percentage	Average	Percentage	Average	Percentage	Average	Percentage	Average	Percentage	Average
«Native»	80	1.0	89	1.8	82	1.3	99	1.9	96	1.8	89	1.6
White Dutch	57	0.8	78	1.5	78	1.2	91	1.9	82	1.2	77	1.3
Green Globe	51	0.6	80	1.6	62	1.0	93	2.4	91	1.5	75	1.4
Average	63	0.8	82	1.6	74	1.2	94	2.1	90	1.5	80	1.4
«Native»			77	1.6	87	1.3	96	1.8	94	1.8	89	1.6
Sirius Riesen			76	2.0	71	1.2	95	2.0	81	1.3	81	1.6
Zwaans Brabo			66	1.0	55	1.0	92	1.9	71	1.1	71	1.3
Zwaans Favoriet			86	1.1	60	1.2	92	2.1	83	1.3	80	1.4
Gelria			67	1.5	58	1.0	92	2.0	75	1.4	73	1.5
Lincolnsh. Red Globe			82	2.0	65	1.2	93	2.2	85	1.6	81	1.8
Purple Top Mammoth			91	2.3	75	1.4	96	2.2	85	1.7	87	1.9
Average			78	1.6	67	1.2	94	2.0	82	1.5	80	1.6

Variety 3 was damaged less than the others, the damage remaining below the average each year. Variety 7 shows the opposite tendency the damage being continually above the average. The number of damaged specimens of the »Native» big-leafed turnip was above the average in this group.

As the tests comprised turnips of different shapes, it is interesting to examine whether the shape of a turnip has any relation to the damage caused by the cabbage maggots. The material in this examination was considerably larger than that mentioned above, because also varieties used in tests for shorter periods were included. Since the tests did not comprise a sufficient number of turnips of each shape in all the years in question, the results are presented in two different groups (Table 2) in order to facilitate comparison. The total of 200 turnips of each test member was examined also here. In cases where the tests of the same year had the same sowing time and growing place or where the damage to the standards was equal in extent, the results of the trials have been combined. The varieties Sirius tetrapl. Svalöv and Petrovski Turnip have been excluded, because the damage to these varieties very distinctly deviates from the general level.

The flat and flat-round big-leafed turnips were examined in the course of two years and the damage was identical with that to the round big-leafed turnips in the same tests. Likewise the damage in the round big-leafed turnips included in the tests during five years was identical with that in the long-round and fairly long turnips in the same tests.

Table 2. Damage caused by cabbage maggots (*Hylemyia* spp.) to big-leafed turnips of different shapes at Tikkurila in 1951—55. Scale: 0 = fully healthy, 5 = fully damaged.

Year	The flat and flat-round			The round			The long-round and fairly long		
	Number of varieties	Percentage of damage	Average	Number of varieties	Percentage of damage	Average	Number of varieties	Percentage of damage	Average
1951	5	61	0.8	6	56	0.7			
“	6	39	0.5	4	45	0.6			
1952	19	70	1.3	22	71	1.5			
Average		57	0.9		57	0.9			
1951				4	45	0.6	3	39	0.4
1952				22	71	1.5	11	78	1.6
1953				5	62	1.0	7	65	1.2
1954				4	93	2.1	5	93	2.1
1955				4	83	1.4	5	80	1.4
Average					71	1.3		71	1.3

These tests show that the shape of the turnip does not seem to affect the susceptibility of the variety to damage caused by cabbage maggots; the damage was either slight or moderate. It is, however, obvious that in case the damage is severe the round and long-round varieties which generally have strong roots endure damage better and recover from it more quickly than the flat and flat-round varieties with thin roots. Thus the shape of the turnip may also be of importance in regard to the top yield.

Summary

Of all the varieties most generally cultivated in Finland (the »Native» big-leaved turnip, the White Dutch, and the Green Globe) the »Native» big-leaved turnip proved to be the most susceptible to damage caused by cabbage maggots. The damage suffered by the Sirius tetrapl. Svalöv variety included in the tests only for two years, was considerably slighter than in other varieties.

In the second test in which the varieties listed on page 272 were included for four successive years, the *Zwaans Brabo* was damaged least of all, the damage being below the average in every year investigated. As to the Purple Top Mammoth the damage was continually above the average. In this group, too, the number of the damaged specimens of the »Native» big-leaved turnip was above the average.

The shape of the turnips (the material was grouped as follows: 1. the flat and flat-round, 2. the round, and 3. the long-round and fairly long turnips) did not seem to affect the extent of the damage caused by the cabbage maggots, not at any rate when the level of damage was slight or moderate as in the cases investigated. It is, however, obvious, that in cases of severe damage the round and long-round varieties which generally have strong roots, endure damage better and recover from it more quickly than the flat and flat-round varieties with their thin roots.

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SELOSTUS:

ERI NAATTINAURISKANTOJEN ALTTIUDESTA KAALIKÄRPÄSTOUKKIEN (*Hylemyia* spp.)
AIHEUTTAMALLE VIOITUKSELLE.

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Vuosina 1951—55 tutkittiin Tikkurilassa kaalikärpästen aiheuttamaa vioitusta eri naattinauris-kannoissa. Eri vuosina vioitus vaihteli tuntuvasti eri kannoissa, minkä vuoksi yhden vuoden tarkastus-tulosten perusteella ei voida tehdä johtopäätöksiä jonkin kannan alttiudesta kaalikärpäs vioitukselle. Tässä esitettyinä vuosina oli maassamme yleisimmin viljellyistä naattinauriskannoista (»kotimainen» naattinauris, Valkea hollantilainen ja Green Globe) »kotimainen» naattinauris alttein kaalikärpäs vioitukselle. Kahtena vuonna kokeessa olleessa kannassa Sirius tetrapl. Svalöv vioitus oli tuntuvasti vähäi-
sempi kuin muissa kannoissa.

Toisessa kantakokeessa (kannat on lueteltu sivulla 272) voittui vähiten Zwaans Brabo, jossa vioitus jokaisena neljänä koevuonna jäi keskimääräistä vioitusta vähäisemmäksi. Kannassa Purple Top Mammoth taas vioitus oli jatkuvasti keskimääräistä runsaampaa. Tässäkin ryhmässä oli »kotimaisessa» naattinauriissa keskimääräistä enemmän voittuneita.

Nauriiden muodolla (aineisto oli ryhmitelty seuraavasti: 1. litteät ja litteänpyöreät, 2. pyöreät ja 3. pitkänpyöreät ja pitkähköt nauriit) ei näyttänyt olevan vaikutusta siihen, miten altis jokin kanta on kaalikärpäs vioitukselle; vioitus oli lievää tai kohtalaista. On kuitenkin ilmeistä, että vioituksen ollessa ankara pyöreät ja pitkänpyöreät kannat, jotka yleensä ovat voimakasjuurisia, kestävät vioitusta paremmin ja toipuvat siitä nopeammin kuin ohutjuurisemmat litteät ja litteänpyöreät kannat. Täten saattaa nauriiden muoto vaikuttaa myös naattisadon määrään.