

The winter irruption of the Fieldfare *Turdus pilaris* and the supply of rowan-berries

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When the mountain ash (rowan) has a good berry crop part of the Fieldfare population remains in Finland after the time of normal migration, the rest migrating at the normal time in the autumn. When the ground is covered with snow and there is a shortage of rowan-berries Fieldfares invade urban centres from the outlying countryside. The factor releasing winter emigration is the diminishing of the berry reserves to a few berries per inflorescence. The critical level of food supply is higher for the Fieldfare than for the Waxwing. The significance of this difference between the species is briefly discussed.

Introduction

The Fieldfare *Turdus pilaris* is regarded as a bird with irruptive tendencies in its migratory habits (SVÄRDSON 1957, ULFSTRAND 1963). The wintering area of Scandinavian and Finnish Fieldfares (mainly in south-western Europe and in western Mediterranean) varies, at least to some extent, from year to year when the birds move according to the availability of food (SVÄRDSON 1957, RENDAHL 1960, ASHMOLE 1962, NORDSTRÖM 1963, ERARD 1967).

Hundreds and even thousands of Fieldfares were observed in many localities in southern Finland on the best days in the winter of 1964/65. JOGI (1967) and HELM (1971) described the Fieldfare invasion in Estonia during the winter and the present author published data on the mass occurrence in Finland (TYRVÄINEN 1970). Fieldfares were seen again in abundance in the winter of 1969/70 in Finland. Data about the occurrence in question were published by HIETANEN et al. (1970) and JÄRVINEN (1970).

The aim of this paper is to investigate the reasons why Fieldfares occur in winter in the North and to establish the effect of food shortage on the irruption and, especially, emigration of the species.

Material and methods

An enquiry concerning the mass occurrence and food of the Fieldfare in the winter of 1969/70 was sent out to ringers in January, 1970, and in February, 1970, to the winter bird counters. This form was similar to that sent out in 1965 (see TYRVÄINEN 1970). In addition to the Fieldfare observations and estimations of the berry crop of the rowan attention was this time paid to the date of exhaustion of the rowan-berries. In all, 198 answers were received from 216 persons and two clubs.

The Fieldfare data from the autumns of 1970 to 1973 are mostly from Tampere (61°30'N, 23°50'E). In addition to the author's material, the members of the Ornithological Society of Tampere have provided observations from this district. The rowan-berry crop in

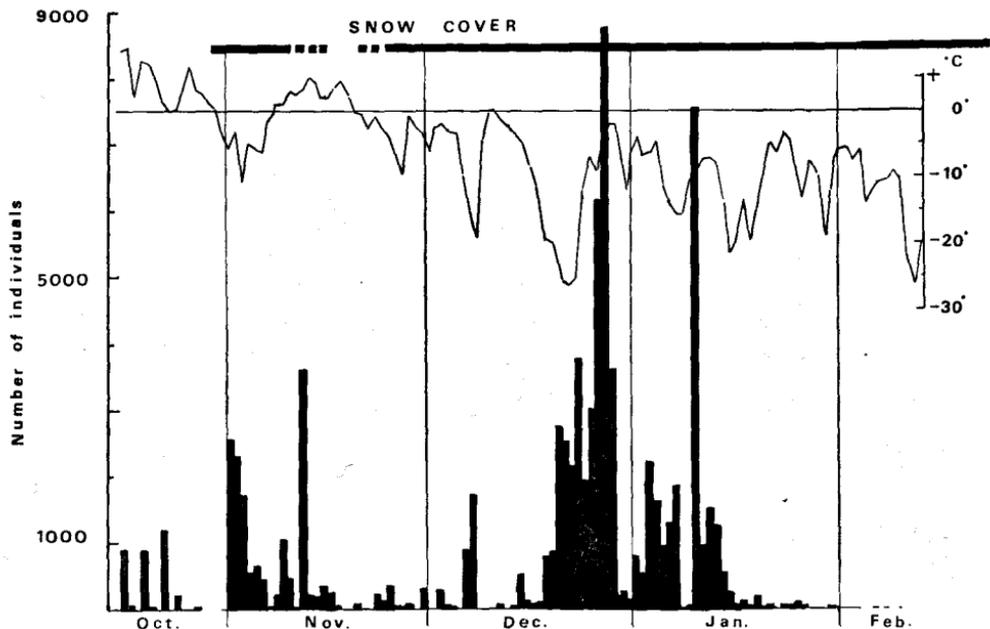


FIG. 1. Numbers of Fieldfares in Finland and mean temperatures and existence of snow in Tampere in winter 1969/70.

the years in question was estimated in Central Finland between Kuopio-Jyväskylä-Tampere and in 1972 also in West Finland between Pori-Kankaanpää-Jämijärvi.

It is rather easy to establish how many berries are missing from an inflorescence of rowan-berries. In the winters of 1969/70 to 1973/74 estimates of the consumption of the berry supply were made in the suburb of Kaukajärvi in Tampere and in the urban parks of the town proper. The Kaukajärvi area measures several sq. km. and the mountain ashes are mainly at the edges of forests and around gardens.

Attempts were made to follow the rate at which the berries diminished. In the autumn and early winter of 1973 careful observations were made on eleven trees. The percentage of berries remaining on these trees was estimated at intervals of ten days. Five of the trees were near a track in a forest, three by

a road with little traffic and three about ten metres from a street with fairly heavy traffic in the centre of Kaukajärvi.

The conclusions in this paper were in most cases drawn from combined observations made by many ornithologists. The difficulties of processing this kind of material have been discussed earlier (TYRVÄINEN 1970).

The temperature in Finland during September 1969 was generally 0.5—1.5°C lower than average. Lapland was covered by thin snow on October 29. The snow cover in southern Finland and daily mean temperatures in Tampere are given in Fig. 1. The mean temperatures in the winter of 1969/70 were generally a little lower than average.

Origin of the mass occurrence of Fieldfares

Usually the Fieldfare migrates from Finland in late September and October

(BERGMAN 1951, VON HAARTMAN et al. 1970). The data available give an idea of the migration of Fieldfares in the autumn of 1969.

On the west coast autumn migration seemed to reach a peak in early October.

Kokkola (63°50'N, 22°42'E): On September 24 the first flocks of approx. 300 ind. (S-SW). On October 1 mass migration: several flocks of 500—1000 ind. and two approx. 3000 ind. (SSW). On October 5 approx. 5000 ind. and October 20 only tens (SW) (Harri Hongell).

Pietarsaari (63°40'N, 22°06'E): On October 7 and 8 flocks of 100—200 ind. totalling 2000 and 1000 ind. On October 9 slight migration and October 10 apparent migration 100—200 ind.) and on October 12 only 23 stationary ind. remaining (Terho Harju and Christer Nyman).

Inland in southern Finland tens to hundreds of Fieldfare were seen daily in October, most of them migrating or covering large distances from one mountain ash to another (Lahti: HIETANEN et al. 1970, Pekka Kuivalainen, Osmo Ruottinen, Ari Ferm; Tampere: H. Virtanen, H. Tyrväinen; Kuhmoinen: Pekka Rajala; Suonenjoki: H. Tyrväinen).

On the southern coast of Finland migration seems to become noticeable in late September and early October, the numbers rising to mid-October. From this region counts in favourable observational places around Helsinki

were placed at my disposal by Mr. K. Malmström. The observations were made 5.00—11.00 hrs.:

Date	Ind.	Date	Ind.
Sept. 4	13	Oct. 7	461
" 10	21	" 11	549
" 13	3	" 16	900
" 19	193	" 23	77
" 25	208	Nov. 4	423
" 28	22	" 6	100
Oct. 1	107	" 10	400
" 4	62	" 12	3603
" 5	147		

In late September and in October, 1969, the flight directions of SW—E predominated in southern Finland over the W—NE, the difference being statistically highly significant (Fig. 2, $\chi^2 = 17.86$, $P < 0.001$).

In the autumn of 1969 migration of the Fieldfare occurred at the normal time. However, in many localities solitary birds, small flocks and some of hundreds of individuals were seen after that time in late October (HIETANEN et al. 1970, JÄRVINEN 1970, Fig. 1). In autumn the Fieldfares move into outlying woodlands (SIIVONEN 1940) and therefore it is not easy to establish this existence. In late autumn observations are probably not recorded as often as later, after the normal time of migration. Therefore it seems obvious that Fieldfares were more abundant in the

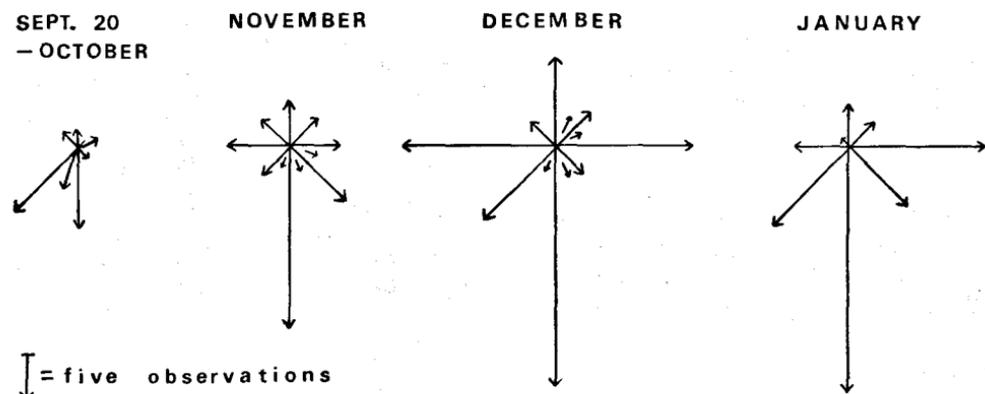


FIG. 2. Flight directions of Fieldfares in southern Finland in winter 1969/70.

late autumn of 1969 than Fig. 1 indicates.

The occurrence of Fieldfares in winter 1969/70

After the quiet season in late October 1969 flocks of tens of Fieldfares were seen abundantly everywhere except in northern Finland. Peak records were reached at the end of December and in early January (Fig. 1). At that time tens, a daily maximum of hundreds and even thousands of individuals were seen in most localities by single observers. Single Fieldfares were seen even in the north:

Rovaniemi (66°25'N) on November 2 and December 28 1 ind. (Aimo and Mirja Komonen).

Ylitornio (66°25'N) 1 ind. was wintering (Toivo Kassinen).

Kuusamo (66°) on December 2 1 ind. (Eero Kemilä).

Further south in Tornio-Kainuu 1 ind. was seen in Puolanka and in Vaala, single individuals and small flocks in Simo and flocks of over a hundred individuals in Kemi (Eero Kemilä, Tauno Kalkkinen, Pentti Rauhala).

At the same time large flocks of Fieldfares were seen in Sweden, too (BARTLER 1969). During January observations decreased and at end of the month only solitary birds were seen. During March also the single birds disappeared (in the second half of March only five observations). When the Fieldfares were most abundant their numbers seemed to equal those of the winter of 1964/65. The mass occurrence in the winter of 1969/70 ended two or three weeks earlier than 1964/65 (Fig. 1 and TYRVÄINEN 1970). The Waxwings invaded southern Finland earlier than 1964/65 (HIETANEN et al. 1970, JÄRVINEN 1970, TYRVÄINEN 1970).

W—S—E flight directions were more common than northerly ones (Fig. 2).

Effect of food factors on the occurrence of Fieldfares

In the winter of 1969/70 rowan-berries were reported to be the main food of Fieldfares in 144 responses out of 157, juniper berries in 7 and berries of *Hippophaë* in two responses. The following subsidiary food or feeding places were reported (the figures refer to the number of observers):

<i>Juniperus communis</i> (berries)	6
<i>Crataegus</i> (berries)	18
Apples	14
Buds and catkins of deciduous trees and bushes	6
Alluvial land	7
Bird-tables, etc.	5
Arable land	2
Other places	9

The result is very similar to that of the winter 1964/65 (TYRVÄINEN 1970). Feeding places in gardens, such as apple trees and *Crataegus* are easily discovered. On the other hand, feeding on junipers is difficult to record. For that reason the significance of juniper berries as a subsidiary food is probably greater than the figures seem to indicate.

TABLE 1. Estimates of the rowan-berry crops in different zoo-geographical areas of Finland in autumn 1969. Figures are numbers of responses. Statistics from 1964 according to TYRVÄINEN 1970.

	Very good	Good	Normal	Poor
Peräpohjola	—	—	1	—
Tornio-Kainuu	5	—	2	—
Maanselkä	1	1	—	—
Suomenselkä	1	7	1	—
Ostrobothnia	9	15	1	—
Lake Finland	29	21	1	1
S.W. Finland	29	35	4	1
Total 1969	74	79	10	2
Total 1964	125	126	35	4

The rowan-berry crop was generally estimated to be good or very good in the whole country (Table 1). The berries were almost as plentiful as in the

autumn of 1964. According to the census available, the rowan-berry crop in 1964 was several times more plentiful than average (ERIKSSON 1970).

The obvious reason for the Fieldfare occurrence in the winter of 1969/70 was the good crop of rowan-berries. The fluctuation of Fieldfare numbers in the course of the winter can also be explained by food factors.

The rough average of the supply of rowan-berries in the winter of 1969/70 in Kaukajärvi is given in Fig. 3. More detailed records were as follows:

On September 1 the berries seemed to be ripe. On Sept. 14 the first tree top from which some berries were eaten was noticed. On Oct. 11 almost the whole berry crop remained even in the middle of the forests. On Oct. 26 plenty

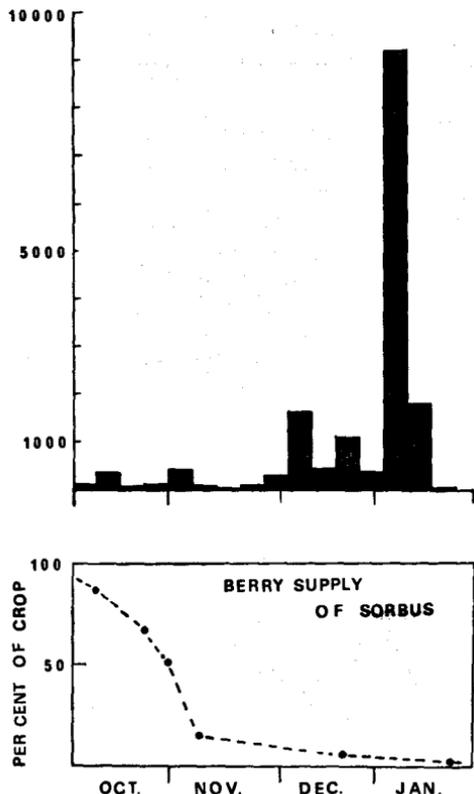


FIG. 3. Numbers of Fieldfares recorded in Tampere and rowan-berry supply in Kaukajärvi in winter 1969/70.

of berries were left on mountain ashes near roads and in gardens, but on Nov. 1 only about half of the crop was left. There were some trees on which almost all the berries were exhausted. On Nov. 9 in the places near heavy traffic about a quarter of the crop was left. On Dec. 22 in these places from about 5 to 25, on few trees 50 per cent of berries were left. On January 14 even in the forest a few berries per inflorescence were found. The berries were dry and wrinkled, but did not taste bad.

Tampere, the urban parks in the centre:

On January 4–6 about a quarter of rowan-berries remained but on Jan. 15 almost all were exhausted.

The consumption of the rowan-berries immediately after ripening seemed to be small (Fig. 3). At this time the Fieldfares could probably find food on the ground. The consumption of berries was greatest in late October and early November. All food on the ground was by that time covered with snow (Fig. 1). The rapid decrease in rowan-berries just at the end of October and beginning of November indicates that the Fieldfare population in the country was still large.

Because only few Fieldfares were seen in northern Finland, the continuous flight in SW–E directions probably caused a decrease in the Fieldfare population in Finland. Even so, this did not show up in the numbers of individuals recorded. For instance, in early January in Tampere about twenty times as many Fieldfares were seen as at the beginning of November after the first snow fall (Fig. 3). However, less rowan-berries were consumed in Tampere during the peak recordings in January than in November. During both periods the berries were almost exclusively the food of the species. The Fieldfare was also clearly the main consumer of these berries. During the period in question the temperature was the same. The greater consumption of the berry supply in November indicates that Fieldfares were more abundant in Tampere at that time than later.

The rowan-berries were exhausted

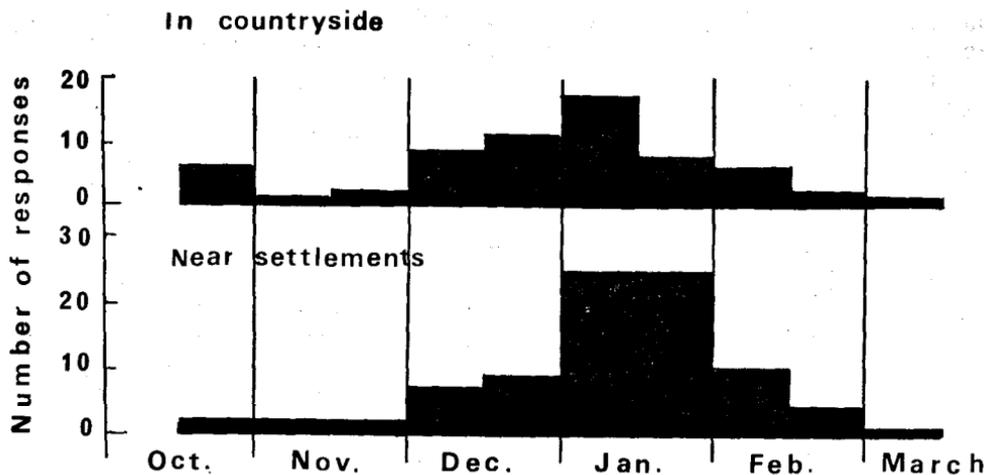


Fig. 4. Date when rowan-berries recorded to be exhausted in outlying countryside and near settlements in Finland in winter 1969/70.

first in the outlying countryside and about a week or two later near settlements and roads of rural districts and finally in towns (Fig. 4). When the food supply decreased the flocks were reported to grow larger and to move more, both in the winter of 1964/65 and 1969/70 (HIETANEN et al. 1970, TYRVÄINEN 1970). During the two irruptions the largest flocks were seen in towns. Such flocks moving from one mountain ash to another and flying here and there above towns are easily observed. Because most ornithologists live in towns during winter, proportionally most Fieldfare data are recorded there.

Considering the time of rapid consumption and ending of the food supply in the winter of 1969/70 the peak of the Fieldfare data in the turn of the year follows significantly from an invasion from outlying forests to towns. In my opinion the peak of abundance was only apparent and emigration occurred before that. In the winter of 1964/65 the numbers of observed Fieldfares reached their peak at the end of December and in January (TYRVÄINEN 1970). At that time Fieldfares

had started to appear in Estonia, probably migrating from Finland (JOGI 1967).

During severe frosts Fieldfares were recorded especially abundantly (Fig. 1). Such differences in the numbers of birds observed are probably caused by different food consumption at varying temperatures and by the behaviour of the birds rather than by actual fluctuations in the numbers of the Fieldfares in the country (HIETANEN et al. 1970, TYRVÄINEN 1970).

In the autumn of 1972 the rowan-berry crop in Central Finland (at least between Kuopio-Jyväskylä-Tampere) was exceptionally short, and also shorter than usual in western Finland (Pori-Kankaanpää-Jämijärvi). At Kaukajärvi, Tampere, a few trees with berries were observed. By September their supply of berries was completely eaten. After this, Fieldfares were often seen to feed on overripe apples. At the beginning of October solitary Fieldfares and small flocks were regularly recorded in the Tampere districts. Later Fieldfares were no longer seen, even though the winter was unusually mild

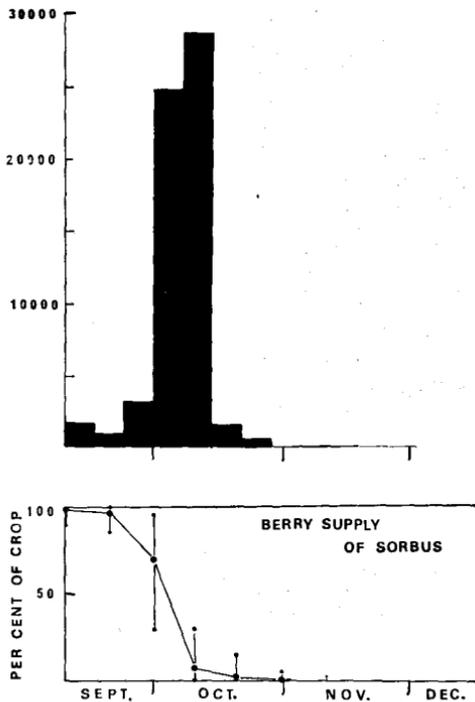


FIG. 5. Numbers of Fieldfares recorded in Tampere and rowan-berry supply in Kaukajärvi in autumn 1973. \pm = amplitude between the berry supply of the trees estimated.

with very little snow, which fell only at times.

In the autumn of 1973 the berry crop in Central Finland was good. At Kaukajärvi, Tampere, the rowan-berries were already exhausted in October (Fig. 5). Plenty of Fieldfare flocks were recorded at the same time, often together with Redwings. Most of them were seen migrating W—SE. In the urban centre of Tampere about a quarter of rowan-berries remained after the disappearance of the Fieldfares.

SVÄRDSON (1957) suggests that invasions start annually in the same way as ordinary migration. However, a good food supply halts the movement and invasion birds become sedentary. Fieldfares are sometimes observed to roam, probably even northwards, before migrating in the ordinary way

from Finland (VON HAARTMAN et al. 1970). ULFSTRAND (1963) includes the Fieldfare among species which have to travel some distance before the food factor begins to operate and irruptive tendencies are noticeable. VON HAARTMAN et al. (1970) and TYRVÄINEN (1970) state that, in years when rowan-berries are plentiful, Fieldfares remain in Finland for the winter. The data of this paper support this opinion. Part of the population always migrates at the normal time in autumn, but the migration of the rest is prevented by a good supply of rowan-berries. The latter part of the population corresponds to SVÄRDSON's (1957) invasion type already in Finland, in the area the birds obviously originate from. Probably these individuals also show migratory restlessness and are in a physiological condition to migrate during the autumn. Restlessness is seen clearly in the winter when the food supply becomes exhausted. In the autumn of 1973 the rapid decline of rowan-berries took place in Tampere at the normal migration time in October. The autumn migration was rapid and migratory restlessness was very apparent. This probably explains why there were more rowan-berries remaining in the urban centre of Tampere than usual.

After the time of maximum Fieldfare migration in the winter of 1969/70 in most localities few berries per inflorescence of the mountain ash were left (Table 2). The berries were almost as exhausted as in the winter of 1964/65 (cf. TYRVÄINEN 1970). Similarly in 1957 in Sweden, some rowan-berries were still left after the Fieldfare irruption (SVÄRDSON 1957, HANSSON & WALLIN 1958). The last restlessly roaming flocks do not succeed in exhausting the berries altogether.

Even though the Fieldfares fed at first in the countryside, avoiding urban centres, there were no significant differences between the berry supply in

TABLE 2. Rowan-berry supply after irruption of the Fieldfare in winter 1969/70 in Finland. Figures are numbers of responses.

Outlying countryside

	Berries left per inflorescence			
	over 1/2	over 1/4	a few	none
S.W. Finland	—	10	26	23
Lake Finland	5	4	12	20
Ostrobothnia	—	—	11	12
Suomenselkä	—	—	2	3
Maanselkä	—	—	1	1
Peräpohjola	—	—	1	—
Forest Lapland	—	—	—	1
Total	5	14	53	60

Near settlements

	Berries left per inflorescence			
	over 1/2	over 1/4	a few	none
S.W. Finland	1	10	33	28
Lake Finland	2	6	20	17
Ostrobothnia	—	4	14	10
Suomenselkä	—	1	—	3
Maanselkä	—	1	—	1
Peräpohjola	—	—	1	—
Forest Lapland	—	—	—	1
Total	3	22	68	60

these habitats at the end of the irruption (Table 2). The Fieldfares seem to travel to new localities when the berry supply has reached a certain level, i.e. few berries per inflorescence. Evidently, the shortage of food is the deciding factor releasing winter emigration of the last Fieldfares.

After the Fieldfares had left, Waxwings remained in Finland in the winter of 1969/70 feeding on the remaining rowan-berries (HIETANEN et al. 1970, JÄRVINEN 1970). Also in earlier years an invasion of Waxwings was recorded after the observed peak of Fieldfare abundance, continuing after the emigration of the last Fieldfares (SVÄRDSON 1957, HANSSON & WALLIN 1958, VEPSÄLÄINEN 1965, TYRVÄINEN 1970).

The difference in the threshold releasing the emigration of the Waxwing and Fieldfare is likely to lessen the competition between the species at a critical period.

The fact that the Fieldfares emigrate

when there are still some berries available may also affect the nomadic wintering habits of the species. Fieldfares travelling in an unfavourable direction are able to find berries left by others, and so to survive to move to new districts where more food is available.

Acknowledgements

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Selostus: Räkättirastaan talviirruptio ja tarjolla oleva pihlajanmarjojen määrä.

Pääosa tutkimusaineistosta on saatu talvilintulaskijoille lähetetyn kyselyn avulla. Lisäksi on pihlajanmarjojen vuotuista vähenemistä arvioitu Tampereen Kaukajärvellä vuosina 1969—73.

Talvella 1969/70 räkättirastaista oli neljän vuoden tauon jälkeen poikkeuksellisen runsaasti Suomen eteläpuoliskossa. Parhaina päivinä tavattiin tällöin useimmilla paikkakunnilla kymmeniä — tuhansia yksilöitä. Tämän joukkoesiintymän kulkua ja syitä on tässä tutkimuksessa verrattu talven 1964/65 esiintymään.

Sekä talven 1964/65 että 69/70 räkättirastaiden joukkoesiintymät olivat tutkimuksen mukaan samaa suuruutta ja niiden kulku pääpiirteissään samanlainen (1969/70 kuva 1 ja 3). Pihlajanmarjat ovat talvella olleet lähes yksinomaisesti räkättirastaiden ravintona. Muuta ravintoa, jolla on jonkinlaista merkitystä, ovat katajan, tyrnin ja orapihlajan marjat, lehtipuiden silmut, omenat ja tunkiot.

Syksyllä 1969 todettiin eri puolilla maata normaaliin muuttoaikaan selvää muuttoa SW—E-suuntiin. Osa populaatiosta jäi kuitenkin muutosta maahan. Talven kuluessa tapahtui jatkuvasti vaellusta SW—E-suuntiin (kuva 2), kunnes tammikuussa viimeisetkin parvet olivat poissa.

Räkättirastaiden talviesiintymien syynä on poikkeuksellisen hyvä pihlajan marjasato. Syksyn ja talven sää- ja lumiolosuhteilla on ilmeisesti vain toissijainen merkitys.

Vaikka muistiinpanojen perusteella todettiin räkättirastaista ylivoimaisesti eniten vuoden 1969 ja 1970 vaihteessa, oli pihlajanmarjojen kuluutus suurin jo loka-marraskuussa. Kyseisenä tal-

vena marjat vähenivät ensin rauhallisilta paikoilta maaseudulla ja vasta viikkoa tai paria myöhemmin teiden varsilta, pihoista ja kaupungeista. Invaasion loppuvaiheissa suuret levottomasti kiertelevät parvet keräytyivät asutuksen liepeille ja niistä tehtiin paljon havaintoja. Vuodenvaihteen havaintoaihe on tutkimuksessa tulkittu suurimmaksi osaksi näennäiseksi.

Sekä rauhallisilla paikoilla että liikenteen ja asutuksen lähellä pihlajanmarjoja oli irruption päättyessä saman verran jäljellä. Talveksi pohjoiseen jääneillä räkättirastailla on juuri tämän ravinnon vähenemisen tiettyyn minimitasoon — muutamaa marjaan/terttu — selitetty olevan tärkein emigraation laukaiseva tekijä. Viimeiset marjat jäävät yleensä tilhille. Eri korkuisen invaasiota pidättävän kynnyksen on katsottu vähentävän näiden lajien välistä talvista kilpailua.

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