

DET FORSTLIGE FORSØGSVÆSEN I DANMARK

THE DANISH FOREST EXPERIMENT STATION
STATION DE RECHERCHES FORESTIÈRES DE DANEMARK
DAS FORSTLICHE VERSUCHSWESEN IN DÄNEMARK

BERETNINGER UDGIVNE VED
DEN FORSTLIGE FORSØGSKOMMISSION

REPORTS — RAPPORTS — BERICHTE



BIND XXXIII

HÆFTE 1

INDHOLD

O. KJERSGÅRD: Rødgranens vækst i et planteafstandsforsøg på heden. (Report on an Experiment in Spacing of Norway Spruce on a Heath Locality). S. 1—9. (Beretning nr. 258).

CARL MAR: MØLLER og JØRGEN LUNDBERG: Et gødningsforsøg i Gedhus plantage ved Karup. Virkningen af forskellige kvælstofkilder i kombinationer med P- og K-gødskning samt rensning i rødgrankultur på midtjysk hedebund. (A Fertilizing Experiment in the Gedhus Plantation near Karup. The Effect of Various Nitrogen Sources in Combinations with P- and K-Fertilization and Cleaning on a Norway Spruce Plantation on Heathland in Central Jutland). S. 11—30. (Beretning nr. 259).

OLE ZETHNER and BRODER BEJER-PETERSEN: Outbreak Years of the Pine-Shoot Moth (*Rhyacionia buoliana* Schiff.) known from Denmark. (Masseformeringsår for fyrrevikleren (*Rhyacionia buoliana* Schiff.) i Danmark). S. 31—38. (Beretning nr. 260).

BRODER BEJER-PETERSEN: Relation of Climate to the Start of Danish Outbreaks of the Pine Shoot Moth (*Rhyacionia buoliana* Schiff.). (Klimaets betydning for igangsættelse af danske masseformeringer af fyrrevikleren (*Rhyacionia buoliana* Schiff.)). S. 39—50. (Beretning nr. 261).

H. HOLSTENER-JØRGENSEN: Afgrødeanalyser i pyntegrøntbevoksninger af *Abies nobilis*. (Chemical Analyses of Produce from Decoration Green Stands of *Abies Nobilis*). S. 51—73. (Beretning nr. 262).

H. HOLSTENER-JØRGENSEN: Gødningsforsøg i pyntegrøntbevoksninger af *Abies nobilis*. (Fertilizing Experiments in Decoration Green Stands of *Abies Nobilis*). S. 75—82. (Beretning nr. 263).

KØBENHAVN

TRYKT I KANDRUP & WUNSCH'S BOGTRYKKERI

1972

OUTBREAK YEARS
OF THE PINE-SHOOT MOTH
(Rhyacionia buoliana Schiff.)
KNOWN FROM DENMARK

MASSEFORMERINGSÅR FOR FYRREVIKLEREN
(Rhyacionia buoliana Schiff.)
I DANMARK

BY

OLE ZETHNER AND BRODER BEJER-PETERSEN

FAO-expert, Forest
Research Institute, Chittagong,
East Pakistan

Zoological Institute,
Royal Veterinary and Agricultural University,
Copenhagen

In 1961 young stands of pine, especially *Pinus contorta*, all over Denmark were very seriously damaged by the pine shoot moth. This situation initiated a series of investigations on the moth*). The primary aim was to seek methods of prognosis. Such methods should on the one hand ensure the correct timing of possible control operations, and on the other, they should prevent the establishment of routine sprayings every year, a procedure which at that time was suggested by forest managers.

Table 1. Danish outbreaks known from literature and records.

Year of damage	Locality	Source
1805—07	Tisvilde (Z), Hornbæk (Z), Stendalgaard (J)	Boas 1923
1805—07	Daurehøj Plantage (J)	Brüel 1870
1809	Kongsøre Skov (Z)	Boas 1923
1869—78	All Dune Plantations (J)	Bang 1891
1870	Mountain Pine (J)	Fritz 1873—1
1870	Rønne Kommuneskov (B)	Brüel 1870
1873	Plantations all over Jutland (J)	Fritz 1873—2
1884	Tisvilde (Z)	Helms 1902
1880ies	Tølløse Skovdistrikt (Z)	Boas 1923
1890	Jutland?	Borries 1895
1890—91	Tisvilde (Z)	Helms 1902
1895—97	Tisvilde (Z)	Helms 1902
1913	Randbøl, Frederikshaab (J), Odsherred, Ellinge Skov (Z)	SF
1914	Greve Strand (Z)	Boas 1923
1921	Buderupholm (J)	SF
1921	Langeland	Boas 1923
1925	Geel and Rude Skov (Z)	SF
1926	Geel and Rude Skov (Z), smaller	SF
1937	Sonnerup Skov (Z)	SF
1948	Odsherred (Z)	SF 1)
1961	Klosterheden (J)	SF
1961	Plantations near Karup (J)	Heick 1962
1968	Pine, esp. <i>P. contorta</i> , Funen	Hejndorf 1968

Abbreviations: B = Bornholm, J = Jutland, Z = Zealand. SF = State Forestry Authority records. SF 1) = pers. comm.

*) The investigation was supported by the Danish State Research Foundation.

MATERIAL

In this paper a list of outbreaks has been compiled from Danish literature mainly dealing with forest entomology and pine silviculture. The records of the Danish State Forest Authority, the Danish State Dune Forestry Authority and the Danish Heath Society have also been searched. Furthermore, the paper gives the number of inquiries regarding the pine shoot moth received by the State Plant Pathology Institute, Lyngby, and by the Royal Veterinary and Agricultural University, Copenhagen. Besides these some registrations of size and year of outbreak have been carried out in the field.

The bulk of the information has been compiled by Ole Zethner while the manuscript is mainly the work of Broder Bejer-Petersen.

The information found in literature and the three above mentioned records of Forest Services is listed in table 1.

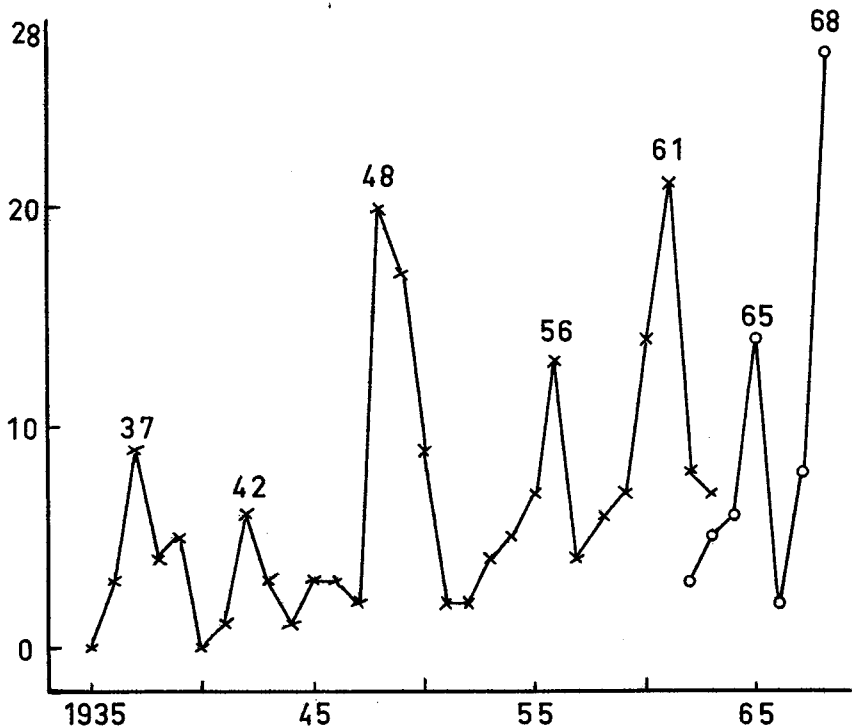


Fig. 1. The yearly number of inquiries on *R. buoliana*. Crosses refer to the records of The State Plant Pathology Institute as well as The Royal Veterinary and Agricultural University; circles refer to the last mentioned institution only.

Fig. 1. Det årlige antal forespørgsler om *R. buoliana*. Kryds angiver summen for både Statens plantepatologiske Forsøg og Den kgl. Veterinær- og Landbohøjskole, mens cirkler er antallet alene fra sidstnævnte institution.

The questions, of which records are kept, have mainly been asked by owners of summer house sites and, to a lesser extent, by forest owners. The yearly number of inquiries during the period 1935—1968 is given in figure 1. The new curve from 1961 represents the inquiries at the Royal Veterinary and Agricultural University only. As it appears from figure 1, the number of inquiries is steadily rising during the period, so that the maximum in 1937 is probably of about the same magnitude as in 1961.

The number of inquiries per year is considered a good expression of the amount of shoot damage and thus probably also of the number of *Rhyacionia*.

OWN REGISTRATIONS

In 1964 countings of damaged leaders and tree tops have been carried out at a number of localities (table 2). At each locality the trees have been chosen at random in the respective stand. The countings cover the period

Table 2. Damage to *Pinus contorta* during the period 1960—64.

Locality and compartment	Percentage leaders damaged					No. of plants investigated	Height m, 1964
	1960	61	62	63	64		
Vrøgum 303, 304 (W-J)	14	59	19	2	9	100	2
Husby 261 (W-J)	9	23	3	0	1	100	2
Stenbjerg (W-J)	14	68	16	0	0	25	3.5
N. of „ „	9	81	30	0	1	100	3
Tranum Overklit 11 (W-J)	3	61	68	3	2	100	2.5
Gedhus 5 (M-J)	—	2	7	1	1	200	1.5—2
E. of Gedhus (M-J)	?	100	20	?	?	200	3—4
Emmesbo 64 (E-J)	17	60	70	0	0	100	3
Rørvig (N-Z)	18	60	70	6	0	50	3

1960—1964, and it turns out that 1961 and to some extent also 1962 are years with very heavy damage at all localities except one (Gedhus 5). In 1961—62 the latter stand was probably too young to suffer heavy damage, as the damage percentage in table 2 for 1964 show a clear relation to tree height (figure 2).

The countings in the years 1965—68 at two localities in Jutland (table 3) agree mutually in showing a higher level of damage in 1968 than in 1967, but they differ from each other in respect to which of the years 1965 or 1966 was the higher. The two localities are rather different in regard to climate, Valskov being considerably drier than Klosterhede.

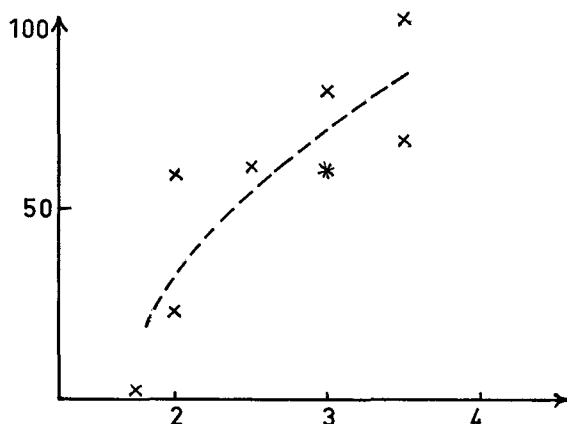


Fig. 2. The relation between percentage contorta leaders damaged in 1961 (ordinate) and the height of the stand in 1964, meters (abscissa.)

Fig. 2. Procenten af beskadigede *P. contorta* topskud i 1961 (ordinat) sammenholdt med træernes højde i 1964, m (abszisse).

Table 3. Damage to *Pinus contorta* during the period 1965—68.

Locality	Percentage tree-tops damaged				No. of plants investigated	Height m, 1968
	1965	66	67	68		
Klosterhede (W-J)	15	9	10	27	1500—2000	1.5—4
Valskov (E-J)	7	26	12	19	900—1300	1.5—4

Table 4. Number of stem deformations in two stands of *P. contorta*, 28 trees, 34 years old, 1964, Nyminde Plantage (W-J).

1933	0	1941	0	1949	4	1957	1
1934	0	1942	9	1950	3	1958	0
1935	0	1943	4	1951	3	1959	0
1936	0	1944	9	1952	3	1960	0
1937	0	1945	4	1953	2	1961	2
1938	1	1946	3	1954	1	1962	4
1939	2	1947	5	1955	1	1963	0
1940	1	1948	10	1956	0	1964	0

In 1964 an analysis of the stem deformations of *Pinus contorta*, at that time 34 years old, was carried out in two stands in Nyminde Plantage (table 4). The trees chosen were those with most stem deformations in the stands. It is believed that the major part of the characteristic deformations are due

to damage by *R. buoliana*. The majority of the deformations took place in 1942, 1944 and 1948.

About 200 moths collected in many *P. contorta* from several localities in 1964 and 1965 have been examined in respect to species, as the very similar *R. pinicolana* is also found in Denmark. Only one was, however, identified as *pinicolana* while the others were *buoliana* (*P. Esbjerg* 1968).

DISCUSSION

As mentioned before, the number of inquiries (figure 1) is believed to give a good expression of the years of *buoliana* damage owing to its "random" appearances. A comparison of this curve and the other sources of information is possible for the period 1935—68. Table 1 then indicates the years 1937, 1948, 1961 and 1968 as peak-years of damage. These years are all consistent with major peaks in figure 1. Furthermore, table 2 shows 1961 as a year with a major rise in the number of damaged tops, while generally speaking 1962 is somewhat lower; this also agrees with figure 1. Table 3 shows higher figures for 1968 than for 1967 which agrees with the trend mentioned, while the two previous years vary locally in this respect. Table 4 gives 1942, 1944 and 1948 as peaks for the analysed 28 trees. Of these years 1942 and 1948 do agree with the curve while 1944 does not.

The Danish data on *R. buoliana* therefore seem to indicate, that major outbreaks are common for all Denmark while smaller outbreaks may occur locally.

ACKNOWLEDGEMENTS

The authors wish to express their thanks to Professor, Dr. Mathias Thomsen for securing funds and working possibilities, to Professor, Dr. N. Haarløv for valuable discussions, to Lars Feilberg, master of forestry, and to Peter Esbjerg for supplying the countings in table 3. Lars M. Nielsen, master of forestry, has provided some of the information in table 1. Finally we wish to thank the many persons in the forest managements who have assisted us.

SUMMARY

A list is given of Danish outbreaks (damage) by *Rhyacionia buoliana* Schiff. A comparison of this list with our own investigations in the field and with records of the yearly number of inquiries on *R. buoliana* shows that major outbreaks tend to be common for the whole of Denmark, while smaller outbreaks may occur locally. The first outbreaks known date back to 1805—7. During the last 35 years, especially 1937, 1948, 1961 and 1968 seem to have been major outbreak years.

DANSK SAMMENFATNING

Masseformeringsår for fyrrevikleren (Rhyacionia buoliana Schiff.) i Danmark.

Som led i prognoseundersøgelser vedrørende fyrrevikleren (*Rhyacionia buoliana* Schiff.) er forekomsten af danske angreb af denne vikler gennemgået. Tabel 1 giver en liste over angreb nævnt i, overvejende forstlig, litteratur, samt arkiver hos Statsskovbruget, Klitvæsenet og Hedeselskabet. Tabellerne 2—4 giver resultatet af egne optællinger udført i årene 1964—68. Figur 1 viser antallet af forespørgsler om vikleren stillet til Statens plantepatologiske Forsøg, Lyngby, og til den forstzoologiske konsultation, Den kgl. Veterinær- og Landbohøjskole. Materialet afspejler en klar tendens til, at store angrebsår er fælles for hele Danmark, samt at der tillige kan forekomme mindre lokale angreb. Det første kendte angreb er fra 1805—7. Indenfor de sidste 35 år synes især 1937, 1948, 1961 og 1968 at have været store fælles angrebsår.

REFERENCES

- Bang, J. P. F.* (1891): Om de nord- og vestjydske Klitters Beplantning. Tidsskr. f. Skovbrug 12: 1—118.
- Boas, J. E. V.* (1923): Dansk Forstzoologi, 2. Ed. Copenhagen 1923.
- Brüel, G. P. L.* (1870): Skovbrugsberetninger for Sommerhalvaaret 1870. Bornholm. Tidsskr. f. Landøkonomi 4 rk. 4: 552—555.
- Esbjerg, P.* (1969): Viklere (Tortricidae) i skud og knopper af yngre contortafyr (*Pinus contorta* Loud.). Flora og Fauna, 75, 3: 117—120.
- Fritz, N.* (1873—1): Hvorfor vil Fyrren ikke trives paa den jyske Hede? Tidsskr. for Landøkonomi 4 rk. 7: 38—46.
- Fritz, N.* (1873—2): Forstentomologiske Meddelelser. Ibid: 450—461.
- Heick, F.* (1962): Årsberetning 1961—62. Hedeselsk. Ti. 83: 195—196.
- Hejndorf, F.* (1968): Rep. from The State Plant Pathology Institute, July 1968: 36.
- Helms, J.* (1902): Skovfyrren paa Tisvilde-Frederiksværk Distrikt. Tidsskr. f. Skovvæsen. 14 B: 196—345.