Statistical Methods. C.1.

REFERENCES

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PRACTICAL STATISTICS

Past experience of an industrial process has shown that it gives components whose strengths are normally distributed with mean 40·0 lb & standard deviation 1·21 lb. The process is modified and to test whether the mean strength has changed, 12 components were selected at random and tested for strength (lb.) giving

39·8, 40·3, 43·1, 39·6, 42·5, 41·0, 39·9, 42·1, 40·7, 41·6, 42·1, 40·8.

What conclusions would you draw? You may assume that the standard deviation of strength is still 1·21 lb. A further random sample of 6 gives

42·7, 41·1, 40·3, 38·8, 39·9, 40·8.

(i) Are the means of the 2 samples statistically significantly different?

(ii) What conclusions would you draw from the combined sample of 18?

(iii) What conclusions would you have drawn from the second sample by itself?

PRACTICAL STATISTICS

Analysis of variance between and within groups.

To compare four special diets with one another and with a normal diet, 30 pigs were tested, 10 being given the normal diet and 5 each the special diets, A, B, C, D. One pig on Diet C died from natural causes unconnected with the diet. The remainder gave the following gains in weight (lb.) over the period of the experiment.

Normal diet	50.9, 34.5, 34.2, 24.7, 49.8, 32.1, 23.0, 21.6, 34.3, 34.2.
Diet A	43.3, 41.2, 37.6, 29.1, 48.1.
Diet B	50.1, 46.2, 36.2, 68.3, 40.2.
Diet C	41.5, 39.4, 59.2, 56.8.
Diet D	50.3, 46.3, 55.8, 47.4, 46.7.

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What conclusions can be drawn concerning the relative effects of the diets ?

50.3
46.3
55.8
152 4

PRACTICAL STATISTICS.

Comparison of Means.

1. The S.D. per plot of sugar percentage in a proposed experiment on sugar beet is expected to be about 2.5. What will be the S.D. of the mean sugar percentage of 10 plots ? How many plots would be required to bring the S.D. of the mean down to 0.1 ?

2. In the above experiment (with the S.D. per plot taken to be 2.50) the mean sugar percentage from 10 plots receiving a basic manurial dressing is 14.6 %, while the mean percentage from 10 plots receiving an additional manurial dressing is 17.8 %. Is this difference significant ?

3. The following figures give the % extension under a given load of two random samples of yarn, first before washing, the second after six washings.

Before washing	12.3	13.7	10.4	11.4	14.9	12.6	
After 6 washings	15.7	10.3	12.6	14.5	12.6	13.8	11.9

Is there evidence that extensibility is affected by washing ?

4. In another experiment on the same type of yarn, six lengths of yarn were selected at random and each length was cut into two halves. One of the halves was tested for extension without washing, the other after six washings, and the following % extensions were obtained

Length	1	2	3	4	5	6
Before washing	13.9	12.5	11.0	11.8	10.8	14.6
After 6 washings	14.7	12.1	13.2	13.6	11.5	15.4

Can it be said that washing has affected extensibility ?
Compare this experiment with that of ex.3.

5. In ex.4, why is it not correct to deduce that washing affects extensibility from the fact that in five cases out of six the % extension after washing was lower ?

6. Two methods of chemical analysis on random samples of the same material gave the following results:-

method A	95.6	94.9	96.2	95.1	95.8	96.3	
method B	93.3	92.1	94.7	90.1	95.6	90.0	94.7

Would you say that one method gives more reproducible results than the other ?

PRACTICAL STATISTICS 4 and 5

Yields of wheat in lbs. per plot (1/500 acre)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	3.63	4.15	4.06	5.13	3.04	4.48	4.75	4.04	4.14	4.00	4.37	4.02	4.58	3.92	3.64	3.66	3.57	3.51	4.27	3.72	3.36	3.17	2.97	4.23	4.53
2	4.07	4.21	4.15	4.64	4.03	3.74	4.56	4.27	4.03	4.50	3.97	4.19	4.05	3.97	3.61	3.82	3.44	3.92	4.26	4.36	3.69	3.53	3.14	4.09	3.94
3	4.51	4.29	4.40	4.69	3.77	4.46	4.76	3.76	3.30	3.67	3.94	4.07	3.73	4.58	3.64	4.07	3.44	3.53	4.20	4.31	4.33	3.66	3.59	3.97	4.38
4	3.90	4.64	4.05	4.04	3.49	3.91	4.52	4.52	3.05	4.59	4.01	3.34	4.06	3.19	3.75	4.54	3.97	3.77	4.30	4.10	3.81	3.89	3.32	3.46	3.64
5	3.63	4.27	4.92	4.64	3.76	4.10	4.40	4.17	3.67	5.07	3.83	3.63	3.74	4.14	3.70	3.92	3.79	4.29	4.22	3.74	3.55	3.67	3.57	3.96	4.31
6	3.16	3.55	4.08	4.73	3.61	3.66	4.39	3.84	4.26	4.36	3.79	4.09	3.72	3.76	3.37	4.01	3.87	4.35	4.24	3.58	4.20	3.94	4.24	3.75	4.29
7	3.18	3.50	4.23	4.39	3.28	3.56	4.94	4.06	4.32	4.86	3.96	3.74	4.33	3.77	3.71	4.59	3.97	4.38	3.81	4.06	3.42	3.05	3.44	2.78	3.44
8	3.42	3.35	4.07	4.66	3.72	3.84	4.44	3.40	4.07	4.93	3.93	3.04	3.72	3.93	3.71	4.76	3.83	3.71	3.54	3.66	3.95	3.84	3.76	3.47	4.24
9	3.97	3.61	4.67	4.49	3.75	4.11	4.64	2.99	4.37	5.02	3.56	3.59	4.05	3.96	3.75	4.73	4.24	4.21	3.85	4.41	4.21	3.63	4.17	3.44	4.55
10	3.40	3.71	4.27	4.42	4.13	4.20	4.66	3.61	3.99	4.44	3.86	3.99	3.37	3.47	3.09	4.20	4.09	4.07	4.09	3.95	4.08	4.03	3.97	2.84	3.91
11	3.39	3.64	3.84	4.51	4.01	4.21	4.77	3.95	4.17	4.39	4.17	4.17	4.09	3.29	3.37	3.74	3.41	3.86	4.36	4.54	4.24	4.08	3.89	3.47	3.29
12	4.43	3.70	3.82	4.45	3.59	4.37	4.45	4.08	3.72	4.56	4.10	3.07	3.99	3.14	4.86	4.36	3.51	3.47	3.94	4.47	4.11	3.97	4.07	3.56	3.83
13	4.52	3.79	4.41	4.57	3.94	4.47	4.42	3.92	3.86	4.77	4.99	3.91	4.09	3.05	3.39	3.60	4.13	3.89	3.67	4.54	4.11	4.58	4.02	3.93	4.33
14	4.46	4.09	4.39	4.31	4.29	4.47	4.37	3.44	3.82	4.63	4.36	3.79	3.56	3.29	3.64	3.60	3.19	3.80	3.72	3.91	3.55	4.11	4.39	3.47	3.93
15	3.46	4.42	4.29	4.08	3.96	3.96	3.89	4.11	3.73	4.03	4.09	3.82	3.57	3.43	3.73	3.39	3.08	3.48	3.05	3.65	3.71	3.25	3.69	3.43	3.38
16	5.13	3.89	4.26	4.32	3.78	3.54	4.27	4.12	4.13	4.47	3.41	3.55	3.16	3.47	3.30	3.39	2.92	3.23	3.25	3.86	3.22	3.69	3.80	3.79	3.63
17	4.23	3.87	4.23	4.38	3.19	3.49	3.91	4.41	4.21	4.61	4.27	4.06	3.75	3.91	3.51	3.45	3.05	3.68	3.52	3.91	3.87	3.87	4.21	3.68	4.06
18	4.33	4.12	4.39	3.92	4.84	3.94	4.38	4.24	3.96	4.29	4.52	4.19	4.49	3.82	3.60	3.14	2.73	3.09	3.66	3.77	3.48	3.76	3.69	3.84	3.67
19	3.85	4.28	4.69	5.16	4.46	4.41	4.68	4.37	4.15	4.91	4.68	5.13	4.19	4.41	3.54	3.01	2.85	3.36	3.85	4.15	3.93	3.91	4.33	4.21	4.19
20	3.61	4.22	4.42	5.09	3.66	4.22	4.06	3.97	3.89	4.46	4.44	4.52	3.70	4.28	3.24	3.29	3.48	3.49	3.68	3.36	3.71	3.54	3.59	3.76	3.36

Yields of wheat in lbs. per plot.

Grouping:	N_i	D_i	D_i^2	
2·90 – 3·09	– 3	–5	25	
3·10 – 3·29	– 4	–4	16	
3·3	– 10	–3	9	
3·5	– 16	–2	4	
3·7	– 23	–1	1	
3·9	– 32	0	0	– 116 · $N_i \times D_i$
4·1	– 34	+1	1	
4·3	– 39	+2	4	
4·5	– 22	+3	9	
4·7	– 7	+4	16	
4·9	– 7	+5	25	
5·1	– 3	+6.	36.	+259.

$\sum N_i D_i$

Sum of (No. in group × deviation from origin)

$\sum N_i D_i = +143.$

$\sum N_i D_i^2 = +1099.$

$\sum N_i D_i^2$

Sum of (No. in group × deviation²)

Mean : $\cdot 2 \times \frac{143}{200} + 3.995 = 4.138$ lbs/plot.

$$\left\{ \left(\sum N_i\right) \sum \left(N_i D_i^2\right) - \left(\sum N_i D_i\right)^2 \right\} \frac{1}{\left(\sum N_i\right)\left(\sum N_i - 1\right)} = \text{Variance}.$$

$\sum x_i^2 - \left(\sum x_i\right)^2 / n.$

Variance $= \frac{1}{12}$ (grouping interval)^2 S.D $= \sqrt{\text{Var.}}$

HISTOGRAMS

Description

1. Divide the range into intervals (groups).
2. Clearly define the extent of the intervals (e.g. 20-25, 25-30, etc. is bad because of the doubt about 25).
3. Count the number of observations in each group.
4. Plot a rectangle on each interval of height % frequency divided by width of interval.

Properties

1. The area of one rectangle is the percentage frequency in the group.
2. If x and y are the lowest points of any 2 intervals, then the area under the histogram between x and y equals the percentage frequency with which results fall between x and y. The total area under the histogram is 100% or 1.
3. Histogram is only useful for fairly large samples. The more observations there are, the more groups can be used. If the groups are too broad, a lot of information is thrown away about the variation of frequency within groups. If the groups are too narrow, there are so few observations in each that random fluctuations swamp the general features.

FREQUENCY CURVES

Description

1. Limiting form of histogram for very large or infinite population. Smooth curve.

Properties

1. Area between x and y is proportion (%) of population with values between x and y. Total area 1 (100%). (See property 2 of histograms).
2. Ordinate of curve is proportion of population per unit "weight".
3. Mathematically the frequency curve is defined by a function f(x), with

$$f(x) \geq 0, \quad \int_{-\infty}^{\infty} f(x)\,dx = 1.$$

NORMAL FREQUENCY CURVE

1. Mean μ , Standard Deviation σ ,
Equation

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-(x-\mu)^2/2\sigma^2}$$

($e = 2{\cdot}718..$)

2. Symmetrical about μ , points of inflexion at $\mu \pm \sigma$.

3. Table of Ordinates

x	f(x)	x	f(x)	x	f(x)
μ	$0.3989/\sigma$	$\mu \pm 3\sigma/2$	$0{\cdot}1295/\sigma$	$\mu \pm 3\sigma$	$0{\cdot}0044/\sigma$
$\mu \pm \sigma/2$	$0{\cdot}3521/\sigma$	$\mu \pm 2\sigma$	$0{\cdot}0540/\sigma$		
$\mu \pm \sigma$	$0{\cdot}2420/\sigma$	$\mu \pm 5\sigma/2$	$0{\cdot}0175/\sigma$		

4. Proportion of Population Outside $\mu \pm k\sigma$

k	Propn.	k	Propn.	k	Propn.
0·0	1·0000	1·2	0·2301	1·6449	0·10
0·2	0·8415	1·4	0·1615	1·9600	0·05
0·4	0·6892	1·6	0·1096	2·5758	0·01
0·6	0·5485	1·8	0·0719	3·2905	0·001
0·8	0·4237	2·0	0·0455		
1·0	0·3173	2·5	0·0124		
		3·0	0·0027		

5. Examples

Thus 5% of the population lies outside $\mu \pm 1{\cdot}96\sigma$.

Therefore 2½% of the population lies below $\mu - 1{\cdot}96\sigma$ and
2½% of the population lies above $\mu + 1{\cdot}96\sigma$.

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Statistical Methods. C.6.

Example

The strengths in lb. of 11 pieces of fabric are

	METHOD I			METHOD II
St (lb.)	$x = St - 60$	Deviation	$(\text{Deviation})^2$	x^2
64	4	-3	9	16
70	10	3	9	100
65	5	-2	4	25
69	9	2	4	81
68	8	1	1	64
67	7	0	0	49
68	8	1	1	64
67	7	0	0	49
66	6	-1	1	36
72	12	5	25	144
61	1	-6	36	1
	Σx 77		90	Σx^2 629
	$\bar{x} = 7$		$s^2 = 9$	Corr 539
			$s = 3$	Sx^2 90
$\bar{St} = 60 + \bar{x}$				s^2 9
$= 67$				s 3

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Example

Calculation of mean and standard deviation from data of sheet C3.

wt. (lb.) W	Centre of Group	x	f	fx	fx^2
0 -	2	-6	1	-6	36
5 -	7	-5	1	-5	25
10-	12	-4	4	-16	64
15-	17	-3	10	-30	90
20-	22	-2	12	-24	48
25-	27	-1	17	-17	17
30-	32	0	24	-98	
35-	37	1	13	13	13
40-	42	2	11	22	44
45-	47	3	5	15	45
50-	52	4	1	4	16
55-	57	5	1	5	25
			100	59	Σfx^2 423

Σx -39

$\bar{x}$ -0·39

Corr. 15·21

s_x^2 407·79

$s_x^{2'}$ 4·1191

Sh. Corr. 0·0833

s_x^2 4·0358

s_x 2·0089

$$x = \frac{W - 32}{5}$$

$$\bar{x} = \frac{\bar{W} - 32}{5}$$

$$\bar{W} = 5\bar{x} + 32$$

$\bar{W}$ = 30·05 lb.

s_W = 10·04 lb.

and $s_W = 5s_x$

Statistical Methods. C.8.

Notes on the Calculation of $\bar{x}$ and s

a). Direct Calculation

(i) Take off a convenient constant and multiply by a convenient constant.

(ii) Add up the observations to form the Total ($\sum x$).

(iii) Divide by number of observations to give mean ($\bar{x}$).

(iv) Add up squares of observations to give uncorrected sum of squares.

(v) Find (Total)^2/number of obs., called correction.

(vi) Subtract from U.S.S. to give Corrected S.S. (Sx^2).

(vii) Divide by (n - 1), degrees of freedom, to give s^2.

(viii) Square root to give s.

(ix) Convert $\bar{x}$ and s back to original units.

b). From Grouped Data

(i) Group: find frequencies f.

(ii) Choose a new origin at the centre of one of the middle groups.

(iii) Put x = (Centre of Group - New Origin)/Interval.

(iv) Find fx, fx^2, $\sum fx$ = Total, $\sum fx^2$ = U.S.S.
$n = \sum f$.

(v) Calculate $\bar{x} = \sum fx/n$ and $s^{2'}$ as before.

(vi) Subtract 1/12 from $s^{2'}$ (Sheppard's correction).
Hence get s.

(vii) Convert $\bar{x}$ and s back to original units.

Suppose that we have a population X of x - values, mean μ_x, S.D. σ_x.

and Suppose that we have a population Y of y - values, mean μ_y, S.D. σ_y.

Take an individual, x, at random from X and, entirely independently, an individual, y, from Y. Find $z = x + y$.

Do this a very large number of times, independently each time, and so form a population Z of z - values.

Then Mean (z) = Mean (x) + Mean (y).

and Var (z) = Var (x) + Var (y).

Proofs.

First part straight from definition.

$$\text{Var } z = \text{Mean}_z(x + y - \mu_x - \mu_y)^2$$

$$= \text{Mean}_z\{(x - \mu_x)^2 + (y - \mu_y)^2 + 2(x - \mu_x)(y - \mu_y)\}$$

$$= \text{Var } (x) + \text{Var } (y) + 2\,\text{Mean}_z(x - \mu_x)(y - \mu_y).$$

Now x and y in the product are chosen independently. Therefore in repeated sampling each x value has associated with it the whole population of y values, for which $\Sigma(y - \mu_y) = 0$. Thus the third term is zero.

General Case.

Var (x + y +.....) = Var (x) + Var (y) + ...

if x, y,.... are independent.

Particular Case

If x, y, ... are independent individuals from same population i.e. if x, y, ... form a random sample from the population

$$\text{Var } (x + y + \ldots) = n\,\sigma^2$$

$$\text{Var}\left(\frac{x + y + \ldots}{n}\right) = \frac{\sigma^2}{n}$$

i.e. St. Dev. of Mean = St. Dev. of Population $/\sqrt{n}$

This is an extremely important formula. x, y,... must be independent for it to hold i.e. the sample must be random.

Estimation of Population Mean

Sample Mean

For any population:

1. $\bar{x}$ is an unbiased estimate of μ.
2. Standard Error of $\bar{x}$ is $\sigma/\sqrt{n}$.
3. For large n the distribution of $\bar{x}$ is nearly normal (except for some peculiar distributions).

For a normal population:

4. For all n the distribution of $\bar{x}$ is normal.
5. $\bar{x}$ contains all the information about μ in the sample i.e. no supplementary calculations can improve our knowledge of μ.

Other Estimates.

Sample median (middle value), etc.

Estimation of Population Standard Deviation.

The Estimate s.

For any normal population:

1. The estimate s^2 is an unbiased estimate of σ^2 and s is a (slightly biased) estimate of σ.
2. For large n, s is normally distributed with standard deviation $\sigma/\sqrt{2n}$.
   (Distribution for smaller n considered later).
3. s^2 contains all the information about σ^2 in the sample.

Other Estimates.

Range/d_n (for normal population), etc.

(see sheet C.11).

Use of Range to Estimate σ

1. The range, w, of a sample is (largest value - smallest value). The larger the sample size the larger w is likely to be.
2. For random samples from a normal distribution we can give divisors to convert the range into an unbiased estimate of σ.

n	d_n
2	1·128
3	1·693
4	2·059
5	2·326
6	2·534
7	2·704
8	2·847
9	2·970
10	3·078
50	4·50
100	5·02
200	5·5
500	6·1

(Range)/d_n is unbiased estimate of σ.

(i) $d_n \simeq \sqrt{n}$ for small n.

(ii) The method should only be used "seriously" for $n \leq 10$. For large n it is useful as a very rough check.

(iii) When we have a large number of small samples (mean range)/d_n is a useful estimate of σ.

Examples

For pig data, $w = 57 - 3 = 54$, $d_{100} = 5·02$, $w/d_{100} = 10·8$

For strength data, $w = 72 - 61 = 11$, $d_{11} = 3·17$, $w/d_{11} = 3·47$

$s = 3$.

Significance Test for Normal Mean: Standard Deviation Known

Population Mean μ_0 (unknown).
Given a random sample of n, mean $\bar{x}$.
In 1% of cases $\bar{x}$ differs from μ by more than 2·576 $\sigma/\sqrt{n}$, etc. (see C.5.).

To test whether $\mu = \mu_0$, calculate

$$u = \frac{|\bar{x} - \mu_0|}{\sigma/\sqrt{n}}$$ (One-Sided Test)

If $u > 1{\cdot}645$, difference from μ_0 is s. sig. at 10% (5%)
$> 1{\cdot}960$, 5% (2½%)
$> 2{\cdot}326$, 2% (1%)
$> 2{\cdot}576$, 1% (½%)

Notes (applicable to sig. tests generally)

1. If we were to apply the test many times and to assert $\mu \neq \mu_0$ every time difference is s. sig. at 1%, then in 1% of cases in which $\mu = \mu_0$ we should be wrong.
2. If difference is not s. sig. at, say, 5%, we are not entitled to assert $\mu = \mu_0$. There may be a real difference but the sample does not justify our asserting one. The results are compatible with $\mu = \mu_0$.
3. Rough general rule is:
   s. sig. at 1% = almost conclusive evidence of difference.
   s. sig. at 5% = reasonable evidence of difference but not conclusive (more data required).
   not s. sig. at 5% = no evidence of a difference: either
   (a) assume no difference
   or (b) suspend judgment and get more data.
   Not hard and fast rules.
4. Always consider what additional evidence is available.
5. Distinguish clearly between technical significance and statistical significance.

Confidence Interval

$\bar{x} \pm 1{\cdot}96 \frac{\sigma}{\sqrt{n}}$ is the 95% confidence interval for μ.

(for multipliers for 99%, etc. see C.5.).

The 95% c.i. has the property that if we use the formula many times, then in random sampling μ lies inside the interval in 95% of cases.

μ is s. sig. different from μ_0 at α% if and only if the (100 - α)% c.i. does not include μ_0.

Test for Normal Mean: Standard Deviation Unknown

Random sample of n from normal distribution.

$$t = \frac{|\bar{x} - \mu|}{s/\sqrt{n}}$$

has a sampling distribution depending on degrees of freedom ν used in estimating σ.

ν	10% pt.	5% pt.	1% pt.
4	2·132	2·776	4·604
6	1·943	2·447	3·707
8	1·860	2·306	3·355
10	1·812	2·228	3·169
11	1·796	2·201	3·106
20	1·725	2·086	2·845
∞	1·645	1·960	2·576

Example

With $\nu = 11$, chance that $|t|$ exceeds 1·796 is 10%.
With $\nu = \infty$, σ is known exactly and we get normal distribution.

Applications.

1. To test whether $\mu = \mu_0$, find

$$t = \frac{|\bar{x} - \mu_0|}{s/\sqrt{n}} \qquad (\nu = n - 1)$$

2. Confidence intervals for μ are

$$\bar{x} \pm t \frac{s}{\sqrt{n}} \qquad (\nu = n - 1)$$

3. To test whether $\mu_1 - \mu_2 = \Delta_0$

$$t = \frac{|\bar{x}_1 - \bar{x}_2 - \Delta_0|}{s\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

($\nu = n_1 + n_2 - 2$ s^2 pooled estimate of σ^2).

4. Confidence intervals for $\mu_1 - \mu_2$

$$\bar{x}_1 - \bar{x}_2 \pm ts\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

Example

Comparison of 2 varieties of tomato. Ten plants of each variety grown in pairs in similar conditions. Yields in kg.

	A	B	A - B
	1·375	1·033	0·342
	1·407	1·217	0·190
	1·068	0·984	0·084
	1·752	1·615	0·137
	1·773	1·693	0·080
	1·201	0·673	0·528
	0·779	0·840	-0·061
	1·042	0·842	0·200
	1·223	1·252	-0·030
	1·633	1·217	0·416
$\sum x$	13·253	11·366	1·886
$\bar{x}$	1·3253	1·1366	0·1886
$\sum x^2$	18·5214	13·9070	0·6818
Corr.	17·5642	12·9186	0·3557
Sx^2	0·9572	0·9884	0·3261
			0·03623

s^2 0·1081

s 0·3288

Method I

2 random & independent samples: are the population means equal?

S.E. of difference of means $= s\sqrt{\frac{1}{10}+\frac{1}{10}} = \frac{0·3288}{\sqrt{5}} = 0·1470$.

$$t = \frac{0·1887}{0·1470} = 1·28 \qquad (18 \text{ d.f.})$$

Not sig.

WRONG in this case: samples are not independent.

Method II

Consider (yield A - yield B) for each pair. Is this a random sample from a population of mean zero?

S.E. of mean $= s/\sqrt{10} = \sqrt{0·003623} = 0·0602$.

$$t = \frac{0·1886}{0·0602} = 3·13 \qquad (9 \text{ d.f.})$$

Sig. at 2%.

Does not depend on assuming 2 samples independent.

Tests for Variances from Normal Populations

Normal Population: variance σ^2.
s^2 an estimate of σ^2 with ν degrees of freedom.
Distribution of $\chi^2 = \nu s^2/\sigma^2$ = Corrected S.S./σ^2 has been tabulated (Fisher & Yates, etc.)

ν	99%	95%	5%	1%
10	2·56	3·94	18·31	23·21
11	3·05	4·58	19·68	24·72
20	8·26	10·85	31·41	37·57

1. Sig. Test for $\sigma = \sigma_0$

   (i) Find $\nu s^2/\sigma_0^2$.

   (ii) If above 5% pt. or below 95%, s.sig. different from σ_0 at 10%, etc.

2. Confidence Intervals for σ^2

$$\nu s^2/\chi^2_5 \leq \sigma^2 \leq \nu s^2/\chi^2_{95}$$

gives 90% confidence intervals, etc.
(For large samples, $n > 30$, $s \pm 1{\cdot}645s/\sqrt{2\nu}$).

---

s_1^2 estimate of σ_1^2 with ν_1 degrees of freedom
s_2^2 indep..... σ_2^2 .... ν_2 .....

Sampling distribution of

$$F = \frac{s_1^2/\sigma_1^2}{s_2^2/\sigma_2^2}$$

is called the variance ratio distribution with (ν_1, ν_2) degrees of freedom. The upper 5% & 1% points are given in most text-books.

e.g. $\nu_1 = 6$, $\nu_2 = 8$

upper 5% pt. 3·58
1% pt. 6·37
lower 5% pt. 1/4·15 = 0·24
1% pt. 1/8·10 = 0·12

Sig. Test for $\sigma_1^2 = \sigma_2^2$

(a) With no prior information
F = (greater s^2)/(smaller s^2). If greater than 5% pt., difference s.sig. at 10%.

(b) With prior information
F = (s^2 expected to be greater)/other s^2. Limits as tabulated.

Statistical Methods. C.16.

Short Table of Significance Limits of Variance Ratio

5 per cent points

ν_2 \ ν_1	2	4	6	10	20	40
2	19·0	19·2	19·3	19·4	19·4	19·5
4	6·94	6·39	6·16	5·96	5·80	5·71
6	5·14	4·53	4·28	4·06	3·87	3·77
8	4·46	3·84	3·58	3·34	3·15	3·05
10	4·10	3·48	3·22	2·97	2·77	2·67
20	3.49 ~~4·35~~	2·87	2·60	2·35	2·12	1·99
40	3.23 ~~4·08~~	2·61	2·34	2·07	1·84	1·69

For fuller table, see Fisher & Yates, etc.

Example

The following are the yields of 4 plots each of 3 varieties of wheat (bushels per acre)

	A	B	C	
	29·2	32·7	18·7	
	36·4	39·3	23·1	
	22·4	28·6	21·3	
	27·6	29·3	19·6	
$\sum x$	115·6	129·9	82·7	328·2
$\bar{x}$	28·90	32·48	20·68	27·35
$\sum x^2$	3341·12	4290·23	1721·15	9452·50
Corr.	3340·84	4218·50	1709·82	8976·27
Sx^2	100·28	71·73	11·33	476·23

Pooled Estimate of Variance within Varieties s^2 = (100·28 +...)/9 = 20·37

Corrected S.S. between Totals ÷ 4 = 292·89

	SS	DF	MS	
Between Varieties	292·89	2	146·45	F = 7·2: sig. at 5%
Within Varieties	183·34	9	20·37	
Total	476·23	11		

Notes

1. Total SS is obtained by considering results as single sample.
2. Total SS = Between Varieties SS + Within Varieties SS.
3. Total DF = Between Varieties DF + Within Varieties DF.
4. MS = S.S./DF.
5. MS within varieties is pooled estimate of σ^2 we had before.
6. If the population means are equal, MS between varieties is estimate of σ^2 with 2 D.F. If there are differences in population means, this MS will be an estimate of something greater than σ^2.
7. If populations are normal & means equal, ratio of MS follows a variance ratio distribution with (2, 9) degrees of freedom. Therefore calculate F & compare with tables. If significantly large, evidence of differences between population means.
8. Estimated S.E. of mean s $\sqrt{\frac{1}{4}}$ = 2·256
   ..... diff. of 2 means = 2·256√2 = 3·19
   Diff. sig. at 5% if it exceeds 3·19 x 2·262 = 7·22
   Diff. between A & B not sig: C sig. different from A & B at 5%.

Example

12 apple trees sprayed against flying moths.

y = % of wormy fruit: x = Size of Crop (100 fruits).

y	x	$\hat{y}$	$y - \hat{y}$
59	8	56·15	2·85
58	6	58·17	-0·17
56	11	53·11	2·89
53	22	41·96	11·04
50	14	50·07	-0·07
45	17	47·03	-2·03
43	18	46·02	-3·02
42	24	39·94	2·06
39	19	45·00	-6·00
38	23	40·95	-2·95
30	26	37·91	-7·91
27	40	23·73	3·27

$\sum y$	540
$\sum y^2$	25522
Corr.	24300
Sy^2	1222
$\bar{y}$	45·00
$\sum x$	228
$\sum x^2$	5256
Corr.	4332
Sx^2	924
$\bar{x}$	19·00
$\sum xy$	9324
Corr.	10260
Sxy	-936

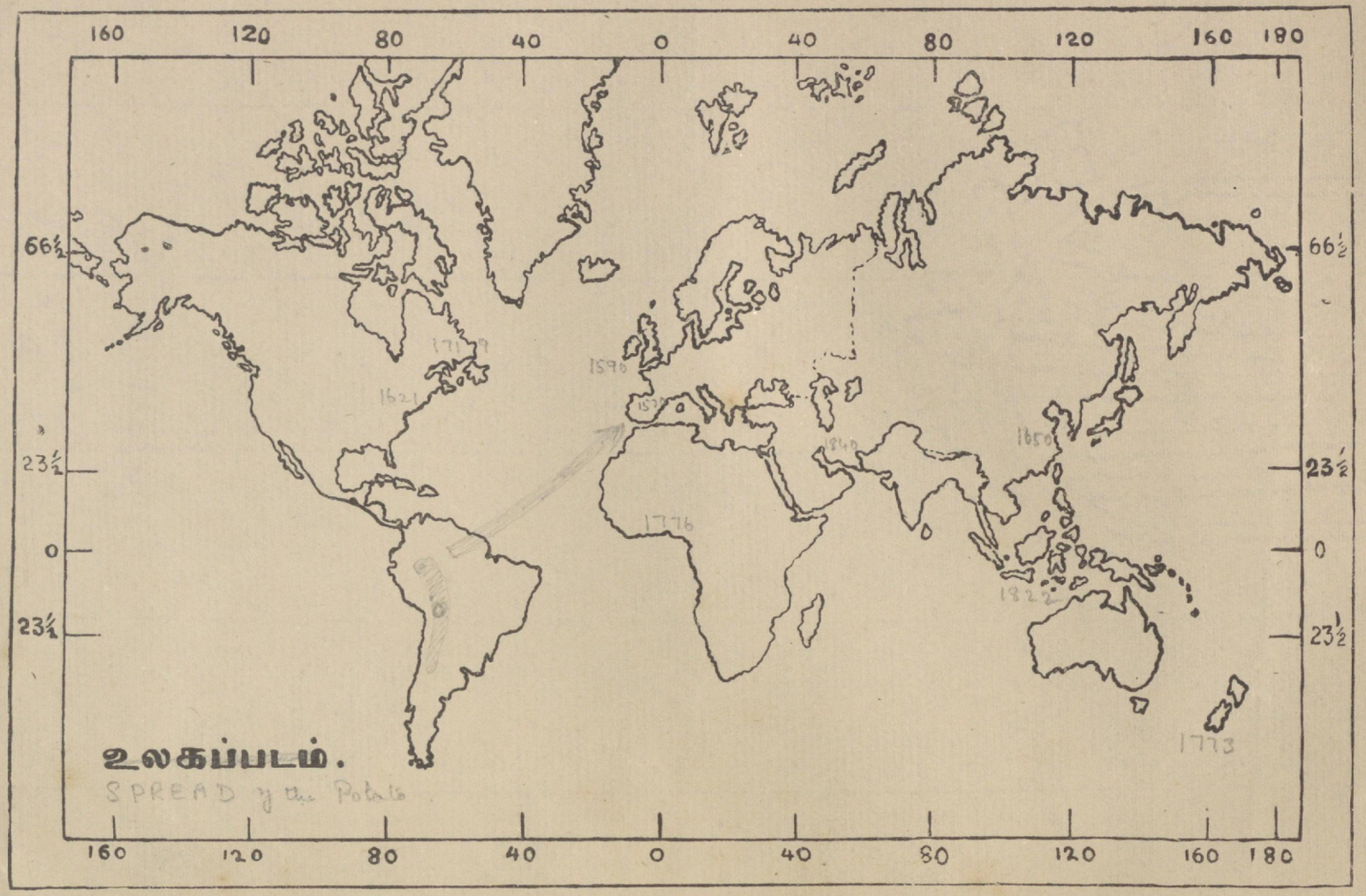
$$b = \frac{Sxy}{Sx^2} = -1·0130$$

Equation of Line $y - \bar{y} = b(x - \bar{x})$ $y - 45·00 =$

$-1·0130(x - 19·00)$

or $y = -1·0130x + 64·25$

From this we get predicted values $\hat{y}$.


160 120 80 40 0 40 80 120 160 180
66½
23½
0
23½
1596
1621
1776
1773
உலகப்படம்.
SPREAD y the Potato

M.S. Swaminathan

Some notes on the exhibition of Dutch plant breeding work.

(Wageningen , 1949)

Choice of Varieties of Farm Crops.

According to the data of the Central Statistical Bureau in 1948 the acreages were as follows:

Winter wheat	74000	ha	Flax	18100	ha
Spring wheat	17400	ha	Winter colza	12000	ha
Winter barley	8900	ha	Caraway	1900	ha
Spring barley	42000	ha	Moonseed	4000	ha
Rye	183500	ha	Mustard	800	ha
Oats	139400	ha	Potatoes	221300	ha
Maize	4700	ha	Sugar beets	46200	ha
Peas	22500	ha	Mangels	63000	ha
Field beans	4500	ha	Swedes	3100	ha
Haricot beans	3700	ha	Total area arable land(excluding fallows)	1052900	ha

In choosing a variety the farmer is guided by the List of Varieties,which describes in an objective way varieties of Dutch and foreign origin.On behalf of those unfamiliar with the Dutch language a commentary on the list is published in English,French and German and some chapters have been translated.

The Institute for Research on Varieties of Field Crops (I.V.R.O.) presents a collection of seed samples of varieties of the most important farm crops.For each crop the samples came from one trial field.The number had to be limited and for more detail the List of Varieties should be consulted.

On a round panel are indicated the percentages of the cultivated area sown to varieties of Dutch origin.This table clearly shows that foreign breeders occupy an important place in regard to several crop plants(rye 99%,spring barley 93%,oats 69%,winter wheat 52%,spring wheat 61%,winter colza 87%,sugar beets 46%, potatoes 29%).Compared to ten years ago the share of the Dutch breeders has decreased in the field of winter and spring wheat , colza and potatoes,but has gained with respect to oats and winter barley.

Breeders of Field Crops.

The map of the Netherlands shows the home of 50 breeders and the number of their varieties placed on the list.Photos of well-known breeders cover the wall.

Inventors and artists are protected internationally (patent right,copyright) which stimulates their activity.The slogan " What the inventor is to industry ,the breeder is to agriculture" draws attention to the fact that the breeder too renders great services to mankind.In the Netherlands the work of the breeder is protected and the aim is to arrive at an international protection.

Research in Plant Breeding.

Attached to the Institute of Plant Breeding are several scientists(partly connected with the Agricultural University,partly connected with the Foundation for Plant Breeding or other institutes).

Attention is drawn to the following subjects.

The important results obtained by the application of inbreeding with subsequent hybridization in maize have prompted Dr F.P.Ferwerda to investigate the possibilities of the utilization of hybrid vigor in rye.It is interesting to compare inbred rye strains with normal rye.Self-fertilization of a normal rye plant gives an offspring consisting entirely of dwarf plants.Crossing of various inbred strains produced a revival of strength and in several cases hybrid vigor,so important in maize breeding,can be observed.

Besides samples of intergeneric hybrids wheat x rye have been added to the show.

Dr G.Bremer and M^{rs} Dr D.E.Bremer-Reinders developed a new kind of rye by using colchicine.The research on the colchicine treatment is done by M^{rs} Bremer,but the research on the chromosomal constitution of the plants is done by the cytologist,Mr Bremer. The photos show that colchicine treatment produces abnormal young plants.Cells arise with the double number of chromosomes (28 instead of 14).Rye plants with 28 chromosomes have very coarse stems and their grain is large.

A photo showing the difference in root development of various pea varieties draws attention to the investigations by Dr A.E.H. R.Boonstra on physiological differences between varieties.Near the Institute's building similar experiments conducted by Ir D. Kloen are in progress.

Ir H.Lamberts is attacking the problem of fodder lupin.The past (bitter lupin),the present (fodder lupin) and the future (lupin with only traces of alkaloid and suited to human consumption)are indicated.

Ir L.Voskuyl gives a panel demonstrating the relation between refraction index and dry matter content in beets;plaster models illustrate the main types of fodder beets.

Dr H.J.Toxopeus shows something about research on resistance to diseases and pests in potatoes.Seedlings of the common potato (Solanum tuberosum) are heavily attacked by the larvae of the Colorado beetle,while this is not the case with seedlings of some Solanum demissum strains.It is worthwhile to attempt control of the Colorado beetle also from the direction of plant breeding. In the field of resistance to Phytophthora the hybrid material is promising.

Near the building is a collection of wild potatoes and crosses between them and the common potato.

Since the foundation of the Institute of Plant Breeding in 1912 many independent organizations have sprung from it as is clearly demonstrated by the genealogical tree.A new scion is the Foundation of Plant Breeding created in 1948.

The progress of plant improvement in the Netherlands can be represented by an ascending spiral.Since 1885,or thereabouts,when systematic Dutch plant breeding started instruction and extension work have grown considerably.The number of breeders has increased and better varieties have been developed.In 1942 the Breeder's Decree became operative (breeder's compensation funds).Government and private business pay more and more attention to plant improvement.This will result in the production of better varieties by the Dutch Breeders which in turn will increase general welfare.

Execution of the Breeder's Decree.

The operation of the Breeder's Decree is illustrated by the development of a fictitious wheat variety Favoriet, which is represented as having originated from a cross made in 1929. One single plant, selected from the hybrid population in 1935, started a new strain which was presented for registration to the Board of the Breeder's Right. Following an investigation begun in 1943 by the Institute for Research on Varieties of Field Crops as to the newness and distinctness of the variety and its agricultural merits it was put on the List of Varieties of Field Crops in 1946. This allowed the marketing of original seed and if the new variety spreads a compensation will be awarded to the breeder for certified seed grown by other persons. The basic idea of the breeder's premium (on original seed) and the breeder's compensation (on once grown or farther removed seed) is not to enrich the breeder but to stimulate his activity so that still better varieties will be produced.

Maintenance of Varieties.

When a breeder has succeeded in having his variety on the List his task is not finished, the variety has to be maintained. To this effect it is necessary to chose regularly plants typical for the variety, which are increased separately followed by bulking of the second or third year's lines to constitute the "breeder's seed". This breeder's seed yields the " elite seed" grown under supervision of the General Netherlands Inspection Service for Seeds of Field Crops and Seed Potatoes (N.A.K.) and which produces the following year the "original seed " that is put on the market. In breeding a new variety of a self-fertilizer one single plant forms the basis of the variety, while the maintenance of the variety is also based on individual plants typical for the variety.

Inspection of the Crop.

The inspection by an impartial agency, the General Netherlands Inspection Service for Seeds of Field Crops and Seed Potatoes, the N.A.K., greatly enhances the quality of the seed and the seed potatoes. Besides the creation of new varieties by the breeder it is also of capital importance that good propagating material of these varieties be brought in circulation.

A map of the Netherlands indicating for each district the acreage presented for inspection in 1948 shows at a glance, by means of the different colors of the small plates, in which district the seed production of green fodder crops, grains and pulse, or seed potatoes predominates.

A survey of the certified acreage of grain, pulse, oil yielding crops, potatoes and green fodder plants since 1933 is given in graph. It shows that in 1947 and 1948 a considerable acreage has been certified. While in 1933 7500 ha of grain etc, and 14000 ha of potatoes were certified, in 1948 the areas were 86500 ha for cereals, pulse and oil yielding plants and 35000 ha for potatoes, while 5000 ha of green fodder plants were certified.

All these certified hectares acquire significance only if this first class material reaches its destination as seed for sowing purposes or seed potatoes at home or abroad. The importance of the export (especially of seed potatoes) is graphically illustrated. In 1947 e.g. 440000 metric tons of seed potatoes were

exported and 70000 tons of cereals,pulse and oil yielding crops.

The certificates delivered by the N.A.K. guarantee to the Buyer that a field and after harvest inspection has taken place. Various certificates are exhibited and also a sealed bag of oat seed with a transparent window showing the certificate inside. A greatly enlarged replica of a leaden seal (with a mill as N.A.K. mark) has been ingeniously transformed into the head of a milch cow. The maker of this image wanted to point out that certified propagating material is an important source of revenue for the Dutch agriculture ,comparable to the dairy products.

The Government Seed Testing Station has sent in material relating to the inspection of seed samples.

Potato Research and Potato Improvement.

Potato breeding has been chosen to give an idea of the research on and breeding of varieties of a field crop.The scales indicate symbolically that the good and the bad properties of every variety are compared to those of other varieties.At an early stage this is done by the Phytopathological Service (wart disease tests),then at the trial fields of the Experimental Farm at Oostwold and later on the trial fields in the various provinces and by means of special trials (scab,spraing ,eelworm,virus diseases, Phytophthora ,cooking quality,storage,aptitude for industrial purposes,trials in foreign countries).

After the newness of the variety has been established it can be put on the List of Varieties.In the Netherlands the potato has three destinations,viz.human consumption,industry (mealy potatoes also good as feed) and production of seed potatoes for the home or export trade.

The data of the exhibition show that in 1949 the Commission for the Advancement of Potato Breeding and the Research on New Potato Varieties has distributed 110000 true seeds.

The increase of the number of the persons specializing in potato breeding is indicated by the following figures : 1935 14; 1940 75 ; 1945 172 ; 1949 206.

At the potato testing farm at Oostwold important work was done in the field of wart disease research,preliminary research on agricultural value,disease free increase and parents to be used in crosses.

A large photo draws attention to the establishment of J.T.Kapenga at Rodeschool,where seed potatoes for the trial fields laid out at home and abroad are grown.

The number of new potato varieties raised from seed which are now grown on the trial fields amounts to 14.In the last few years,owing to more intensive methods of examination,it has become possible to make a quicker decision as to continuing or discontinuing the trials with a seedling clone.

The number of trial fields where observations on new potato varieties were made was 92 in 1948 and amounts at present to 158.

Statistical Data on Varieties.

In a order to promote a judicious choice of varieties and a well regulated supply propagating material a knowledge of the acreage occupied by each variety is of great importance.Varietal statistics began in 1931 and provide a reliable picture of the distribution of the various races.

of

The statistics relating to potatoes show how the data are collected for each agricultural district from which the statistics for the entire country are compiled.

As further examples are chosen winter and spring barley and flax. From the statistics on spring barley one can gather that, thanks to a better choice of varieties (promoted by the NaCoBrouw) good malting quality has been attained with home grown varieties. Most of these, however, were developed abroad and elite seed has to be imported regularly.

Winter barley growing, on the contrary, is almost entirely based on Dutch varieties among which Vindicat took up 81% of the total acreage in 1948.

The graph on flax shows that Concurrent flax has been the leading variety for a number of years, but that at present it has found competitors in varieties developed by P.J.Hijlkema of Mensingeweer (Groningen).

Flax show

The Dutch Flax Institute has sent in samples of flax straw and fibre coming from one trial field, and also samples of straw and fibre of one variety grown under various conditions. There is also a collection of standard samples for determining the quality of straw and fibre. Further some samples demonstrating trials to control thrips are exhibited.

A sample of dressed fibre of the best quality adds lustre to the show. A bundle straw with its lower part chemically retted demonstrates that flax is a fibre plant par excellence.

Near the building are located collections of varieties, trial fields sown to various field crops and plots on which breeding experiments are in progress.

BEDRIJFSCHAP VOOR TUINBOUWZADEN

Nomenclature Seeds:

English:	French:
1. Bushbeans	Haricots Nains
2. Runnerbeans	Haricots d'Espagne
3. Polebeans	Haricots à Rames
4. Broadbeans	Fèves de Marais
5. Peas	Pois
6. Sugar Peas	Pois mangetout
7. Chicory (Witloof)	Chicorées de Bruxelles
8. Corn Salad	Mâche
9. Kale	Choux Frisés
10. Cauliflower	Choux Fleurs
11. Butterkale	Choux à couper/cueillir
12. Brussels Sprouts	Choux de Bruxelles
13. Cabbage Red	Choux Rouges
14. Cabbage White	Choux Blancs
15. Cabbage Savoy	Choux de Milan
16. Cabbage Chinese	Choux de Chine
17. Kohlrabi	Choux-Raves
18. Garden-Cress	Cresson
19. Swiss Chard	Poirée
20. Parsley	Persil
21. Lettuce	Laitue pommée
22. Lettuce (Gather-Cutting)	Laitue couper/cueillir
23. Summer Endive	Laitue Romaine
24. Winter Endive	Chicorées frisées
25. Chives	Ciboulette
26. Celery	Céleris
27. Spinach	Epinard
28. Purslain	Pourpier
29. Carrots	Carottes
30. Parsnips	Panais
31. Radish	Radis
32. Radish (Winter,Spring,Summer)	Radis (hiver,print.,été)
33. Garden-Turnips	Navets Potagers
34. Garden-Rutabagas	Choux-Navets-Rutabaga
35. Beets	Betteraves Potagères
36. Scorzoner	Scorsonères
37. Celeriac	Céleri-Rave
38. Onions	Oignons
39. Leek	Poireau
40. Gherkins	Cornichons
41. Cucumber	Concombres
42. Tomatoes	Tomates
43. Melons	Melons
44. Pumpkins	Courges
45. Dill	Aneth
46. Bobage	Bourrache
47. Chervil	Cerfeuil
48. Herbs (Sundries)	Herbes (diverses)

's-GRAVENHAGE.

M. S. Swaminathan

Latin: (Botanical names)	Dutch:
Phaseolus vulgaris	Stamboonen
Phaseolus coccineus	Pronkboonen
Phaseolus vulgaris	Stokboonen
Vicia Faba, var. major	Tuinboonen
Pisum sativum	Erwten
Pisum sativum	Peulen
Cichorium Intybus	Witlof
Valerianella olitoria	Veldsla
Brassica oleracea var. acephala	Boerenkool
Brassica oleracea var. botrytis	Bloemkool
Brassica oleracea var. (acephala (napus pabul	Boterkool
Brassica oleracea var. Gommifera	Spruitkool
Brassica oleracea var. Capitata	Roodekool
Brassica oleracea var. Capitata	Wittekool
Brassica oleracea var. Sabauda	Savoyekool
Brassica chinensis	Chineeschekool
Brassica oleracea var. Gongylodes	Koolrabi
Lepidium sativum	Tuinkers
Beta Vulgaris var. cicla	Snijbiet
Petroselinum crispum	Peterselie
Lactuca sativa var. capitata	Kropsla
Lactuca sativa var. (acephala (secalina cap.	Snij- en Pluksla
Lactuca sativa var. longifolia	Bindsla
Cichorium Endivia	Andijvie
Allium Schoenoprasum	Bieslook
Apium graveolens	Selderie
Spinacia oleracea	Spinazie
Portulaca oleracea	Postelein
Daucus carota	Wortelen
Pastinaca sativa	Pastinaken
Raphanus sativus var. Radicula	Radijs
Raphanus sativus var. Niger	Ramenas
Brassica Rapa var. Rapa	Rapen
Brassica Napus var. Napobrassica	Koolrapen
Beta vulgaris var. Rapa	Kroten
Scorzonera hispanica	Schorseneeren
Apium graveolens	Knolselderie
Allium Cepa	Uien
Allium Porrum	Prei
Cucumis sativus	Augurken
Cucumis sativus	Komkommers
Solanum Lycopersicum	Tomaten
Cucumis Melo	Meloenen
Cucurbita Pepo moschata	Kalebassen
Anethum graveolens	Dille
Borago officinalis	Borage
Anthriscus cerefolium	Kervel
Herbae Diversae	Grassen (Kruiden)

KEUKENHOF

NATIONALE BLOEMENTENTOONSTELLING
LISSE HOLLAND

THE""KEUKENHOF" NATIONAL FLOWER SHOW, LISSE.

In the Spring of 1950 a permanent National Flower Show is to be opened at the Keukenhof Estate,Lisse. Here,in the heart of buldfield district,from te middle of March until the end of May visitors will be able to see the finest examples of bulb-grower's art,displayed in the only unspoilt area of natural woodland,which has been preserved in this once densely wooded region.

The Keukenhof open-air exhibition of bulb flowers has been planned on a ten-year basis.That alone makes it unique.In addition,however,the site of the exhibition could not have been better chosen. In olden times this part of Holland was a region of forest and duneland,and it is even said that a man could travel all the way from Leyden to Haarlem without once touching the ground-simply bij swinging from tree to tree.

As the centuries passed,the whole countryside was gradually cleared for the cultivation of bulbs.Only one remnant of the original forest still survives and that is the 300-acre Keukenbos near Lisse.The proprietors,the van Lynden family, made it a nature reserve which nobody was allowed to enter, but sixty acres of this magnificent wooded estate are now to be thrown open to the public.Although the unspoilt,natural character has been maintained as far as possible,the ground beneath the forest giants and along the side of the peace-ful lake will soon be bright with hyacinths and tulips of every hue,in addition to gay narcissi and many other bulbs.

GENERAL PICTURE OF FLOWER BULB CULTIVATION!

At the Keukenhof Flower Show,one will be able to admire every product of the bulb-grower's art. The exhibitiors include all the leading firms in the bulb trade,and the flowers on view in this ideal,romantic and sheltered setting will comprise not merely the familair commercial species but also the very latest crosses and other varieties.
After looking at the bulbfields in bloom around Lisse,and thus obtaining some idea of the treat in store,at Keukenhof, itself the public will see the loveliest specimens of every variety displayed in all their splendour.

TELEFOON 3352-3545 (K 2530)

KEUKENHOF

NATIONALE BLOEMENTENTOONSTELLING
LISSE HOLLAND

II.

COMMUNICATIONS BY ROAD AND RAIL.

This great exhibition can be reached without difficulty by bus (starting from the stations of Leyden and Haarlem) and train. The roads leading to the Keukenhof are in excellent condition; some of them have been specially widened for the occasion. Motorists and others will find the routes clearly signposted. There is ample space for the parking of cars and cycles, and special arrangements are being made to obviate traffic congestion. A modern restaurant and a tea-room are situated inside the exhibition grounds.
Transport companies are to provide special facilities, and extra trains and moter coaches will be run from all parts of the Netherlands as well as from other countries.
Lisse's railway station is on the main line from Amsterdam to Rotterdam; while the main highway linking Haarlem and the Hague passes through the centre of Lisse.

FURTHER ATTRACTIONS.

As the "Keukenhof" National Flower Show is to be held in the Spring, it can easily be visited in the course of a tour of the bulbfields. A great annual event takes place at the height of the season(22 April), the Floral Parade, a procession of flower-covered vehicles which traverses the bulb-growing region from one end to the other. Last year it attracted half a million Dutch and foreign spectators. The Dutch Bulb Merchants Association, (the export trade organization), celebrates its golden jubilee in April 1950. Most of the festivities to mark this occasion will be centred round Keukenhof. The inhabitants of the bulbfield-district are remarkably skilled in designing floral mosaics("Paintings" composed of fresh blossoms) and these brightly coloured carpets outspread along the roadside never fail to arouse keen interest among the countless passing tourists.

HISTORY.

The name "keukenhof" dates back to the time when Countess Jacqueline of Bavaria- the lovely but unfortunate 15th-century ruler of Holland- who struggled so manfully for her rights against Duke Philip of Burgundy(Philip the Good)-lived in this district. One of her residences was Teylingen Castle, the ruins of which may still be seen near Sassenheim. In those days the Countess's table was supplied with game from the so-called "kitchen-wood" or Keukenbos.

KEUKENHOF

NATIONALE BLOEMENTENTOONSTELLING

LISSE HOLLAND

III.

Jacqueline's married life was not at all happy. At the age of fifteen she became the wife of the French Dauphin. He died of poisoning, and a year later she married to her cousin, the characterless Duke John of Brabant. This political marriage was not a succes. She left John of Brabant and went to England, where she married Humphrey of Gloucester, a brother of King Henry V. Her hopes of support from him proved to be vain, however, and though her followers fought bravely in defence of her rights the Countess was obliged to yield to superior force and recognize the Duke of Burgundy as Regent of her dominions. While she was subsequently living in retreat, she became into contact with a former adversary, Francis van Borselen, one of Duke Philip's provincial governors. Political motives were not absent from this friendship but it seems to have been based on mutual affection too. On learning that van Borslen was plotting against him and the Countess Jacqueline had secretly married the rebel, Philip had van Borselen imprisoned. Jacqueline secured his release by giving a solemn promise that henceforward she would refrain from all political activity.

But her enjoyment of peace and happiness with van Borselen was not destined to last long. Three years later, when she was only 35 years old, this illustrious scion of the Counts of Holland died at Teylingen Castle, Sassenheim.

The memory of the courageous Dutch Countess still lives on after five centuries and so she has more or less become the "patron Saint" of this great exhibition which is to be held in her former domain. Her portrait adorns all the posters, to let visitors see that the vigour and fighting spirit which characterized Jacqueline of Bavaria are still source of inspiration to the Dutch bulb-growers--though their energies are more peacefully employed! Keukenhof now belongs to Count van Lynden, from whom the organizers if this National Flower Show have leased the exhibition ground.

Further information regarding the exhibition and everything connected with it, photographs, etc. are obtainable on application to the Secretariat, "Keukenhof" National Flower Show- Lisse - Holland.

TELEFOON 3352-3545 (K 2530)

M.S. Swaminathan

THE EXPERIMENTAL STATION FOR VEGETABLE AND FRUIT GROWING UNDER GLASS. NAALDWIJK.

HORTICULTURE IN WESTERN HOLLAND.

In the West of Holland we have the South Holland glass district. This district forms part of the province of South Holland. In this country 2000 out of t 3000 hectares of vegetables and fruit under glass are in this district. The total proceeds of the horticultural products of the 133.000 hectares in our whole country amounts to about Dfl. 310.000.000,- a year. 1/3 of this amount (or Dfl. 100.000.000,-) comes from the crops under glass in the South Holland glass dist from which the intensity of horticulture under glass clearly appears.

At the moment there are more than 6000 nurseries on an area of 7000 hectares of soil suitable for horticulture, so that the average size of a nursery covers 1 to 1½ hectares.

The horticultural district forms part of the Dutch polder district which lies at from 0 to -6 m. below Amsterdam watermark. A rather complicated system of drainage regulates the water level. The crops under glass can be divided into glass-houses and frames. Grapes, peaches, plums and tomatoes are grown in glass-houses, cucumbers, salad, cauliflower etc. in frames.

The experimental station for vegetable and fruit growing under glass with its 6000 members gives the growers scientific advice for the solution of the problems with which they are faced.

Considerable capital investments make it necessary to make intensive use of the areas under glass. The same crops are often grown in the same soil for years, which makes heavy demands on the quality of this soil. So only the best soil should be used for horticulture. The best soils are those with profiles without poor layers down to the ground water level, which varies from 0.40 to 1.20 metres deep under the top layer.

Especially the perential crops such as those of fruit (grapes) under glass require a soil in which their roots can develop, as otherwise a bad development o of the crop above the ground occurs, with all kinds of physiological disturbances.

The Westland horticultural soils can be tested both chemically and physically by the services of the experimental station for vegetable and fruit growing under glass on application.

The chemical soil testing takes place in the laboratory of the experimental station at Naaldwijk and a special service for routine profile investigations in the field maps the physical condition and the structure of the profile. This service which has been established for a few years is overwhelmed with applications as it has appeared that the crops react upon the quality of the profile.

It is especially the position of the water and air conservancy which determines a good or bad development of the crop. The perential plants react most to differences hardly perceptible to an outsider.

When the soil condition of a nursery has been tested on application and mapped, then advice is given for possible improvements, or which very often occur for the construction of new glass-houses and Dutch-light houses, as the glass-houses should always be built on the best parts of the nursery.

When new grounds are being put into use for intensive horticulture advice is often applied for both in connection with the purchase and later-on with the destination of the soil for various forms of crop growing under glass.

The advised soil improvements nearly always consist of drainage and the loosing of certain layers in the sub-soil. Because on an average only part of the grounds lie above ground water level it is of importance that this part of the ground is quite suitable for the development of roots. Hard layers or layers with a poor permeability should be broken up, otherwise the roots cannot develop freely

The precipitation which owing to the glass cover is concentrated locally between the glass-houses and the Dutch-light houses should be caught and drained off quickly, as otherwise the soil in these places would become too wet, which would again unfavourably affect the roots growing sideways out of the glass-houses. Owing to this the level of the ground water is raised temporarily, which hampers the respiration of the roots which are found there.

The control of the ground water level and air supply plays a leading part in intensive fruit growing.

Not only between the glass houses and the Dutch-light houses, but also in the ground water level should be controlled. It is necessary to drain there too. This is the more important as the soil is used more intensively.

Owing to the great dressings of fertilizers and the absence of precipitation together with the strongly prevailing evaporation under glass the concentrated soil moisture rises to the upper layers from which the salts sometimes crystallize.

In autumn after the harvest it especially appears from the chemical soil tests that the total quantity of salts in the soil sample has become too high; then the advice is given to wash the ground with much fresh water (some cubic metres per rr^2 = 14 m^2). In order to be able to wash the salts away a good drainage to the ditches is necessary so that a drainage system in the glass-houses and Dutch-light houses should be provided.

Not only the drainage but also the water supply under glass form a problem. In the vegetable growing infiltration pipes are sometimes used to bring the water from the ditches with an artificially raised water-mark into the ground. Owing to this watering is no longer necessary which often involves deterioration of the texture and too high a moisture content of the air. The high moisture content of the air often promotes the formation of moulds.

The best way of infiltration is experimentally investigated at the moment. The water which is brought into the ground by means of watering or infiltration always comes from the ditches. In spite of the abundance of water in the West of Holland a great lack of fresh water occurred in horticulture during the last few dry summers.

During the last few years owing to the strong evaporation and the slight quantities of precipitation the supply of sufficient fresh water from the East has been inadequate in dry summers to stop the salting up of polder water. The vicinity of the sea and the low position of the land are the causes of this salting up, which has formed a very serious menace to horticulture during the last few years.

Experiments have proved that quantities of 0.5 grammes of kitchen-salt per litre of water and more affect the yields. In 1949 the damage of 4 crops in the Westland alone amounted to no fewer than Dfl. 3.000.000,-.

In broad outlines it can be said that the water in the intensive horticulture in the West of Holland so rich in water plays a leading part so that the struggle on and against the water has for centuries already been the most powerful factor in the history of Holland.

Plantenziektenkundige Dienst
Wageningen

Service Phytopathologique
Wageningen

La Lutte contre le Doryphore en 1948

M.S. Swaminathan

I. Préambule

L'été brûlant de l'année 1947 a été au plus haut degré propice au développement du doryphore. En Hollande, on signale à l'ordinaire le développement complet d'une seule génération, et le développement partiel d'une seconde. En 1947 toutefois, deux générations se sont complètement développées, tandis qu'une troisième a pu se développer encore en partie. Par suite de la ponte abondante et de l'infime parmi les larves, la progéniture d'un seul couple fut, par génération en outre, considérablement plus grande que c'est normalement le cas pour notre pays. En dépit des mesures spéciales, prises dans le cours de la saison 1947, le nombre des doryphores fut au début de l'hiver 1947-1948, si grand, que les perspectives pour l'année 1948 furent peu encourageantes.

La lutte porta en 1948 un caractère fort international. Les mesures prises résultèrent des accords, intervenus au mois de janvier 1948.

II. Information et Propaganda

a. Bulletins de communication

Malgré les bulletins de communication Nos.734 et 736 des 5 février et 16 mars, traitant les mesures en vigueur pour l'année 1948 et les moyens à appliquer, une grande partie de la population rurale resta longtemps encore ignorante de la méthode d'action à suivre. C'est pourquoi on publia dans un troisième bulletin (no.747, en date du 6 avril) un résumé succinct du contenu des deux bulletins précédents.

Au cours de la saison se répandirent encore deux bulletins, renfermant un court aperçu de la situation.

b. Radio

Le 28 mai fut radiodiffusé un discours prononcé par le Ministre de l'Agriculture, de la Pêche et du Ravitaillement, dans lequel il fit ressortir la signification économique du doryphore, en animant les cultivateurs de pommes de terre, ainsi que ceux de jardins ouvriers, d'apporter le plus grand soin à la lutte de cet insecte.

Le "météo" de l'Institut Météorologique Royal aux Pays-Bas (le K.N.M.I.), radiodiffusé par la Presse Générale Néerlandaise (la A.N.P.) et par la Radiodiffusion Régionale du Bud, comprenait toujours des indications sur la lutte et des communications sur les traitements de la végétation, étant de vigueur pour certaines parties du pays.

c. Affichage

Les affiches faites par les soins de la Section Information du Ministère, furent répandues sur une grande échelle, savoir 5.000 pièces de grand format (80 x 110 cm) et 10.000 pièces du format (55 x 80 cm).

Les contrôleurs, nommés pour la lutte contre le doryphore répandirent dans le cours de la saison, 600.000 dépliants, renfermant, de façon populaire, des indications sur la lutte.

Au commencement de la première période de la pulvérisation obligatoire, furent jetés, 150.000 tracts hors de deux avions des Forces Aériennes au-dessus du Limbourg Central et Méridional.

A la fin de la saison la lutte devient habituellement beaucoup moins intense. Les cultures, arrivées à peu près au terme de leur croissance, ne courent plus le danger de subir préjudice du doryphore. Bien que, dans toutes les circonstances, la lutte soit la plus intense l'époque de mai au juillet, il n'est point superflu de détruire le plus radicalement possible les doryphores encore présents en arrière-été. En agissant de la sorte, on réduit considérablement la chance d'une propagation ultérieure dans la période suivante.

Dans un avis officiel, répandu sur une grande échelle (environ 40.000) début août, on y fixa expressément l'attention, en insistant à ce que la lutte soit poursuivie le plus longtemps possible.

d. Action des films

Dans une trentaine de communes au Limbourg Central et Méridional, la Section Information du Ministère de l'Agriculture, de la Pêche et du Ravitaillement donna, dans l'espace du 10 mai au 8 juin des représentations cinématographiques en plein air, dont le film du doryphore constitua l'attraction principale.

On donna quelques six représentations de ce genre également au Achterhoek et dans la Veluwe.

Les résultats d'une telle action s'expriment difficilement en chiffres. Il va sans dire qu'on éveille par là l'attention de la population pour la lutte de cet insecte, mais il reste cependant à savoir, si les bénéfices paient bien les frais qu'amène nécessairement une action pareille.

e. Autorités

Dans la lutte contre le doryphore les maires jouent un rôle prépondérant. La Police y occupe également une importante place. Il importa donc, qu'ils soient bien instruits en ces matières.

Tout comme les années précédentes, les Maires et toutes les autorités policières, les fonctionnaires du Ministère Public, ainsi que les Commissaires de la Reine, recurent une circulaire générale, accompagnée de la documentation technique nécessaire, telle que la Brochure, no.47, Communications, no.79, les bulletins nos. 734 et 736, de même que le "Livret d'Instructions" pour le personnel du service auquel incombe la lutte contre le doryphore.

La circulaire renferma, en rapport avec la circonstance que la Loi sur le doryphore 1947 serait appliquée pour la première fois, un exposé des principaux articles de loi (2 au 7), tandis qu'on jugea recommandable de coordiner les travaux, dans la mesure du possible. Pensez sous ce rapport à l'institution par la la commune des groupes de pulvérisateurs.

Nous saisissons cette occasion d'exprimer notre reconnaissance pour la collaboration précieuse prêtée par les Maires, la Police et d'autres autorités.

f. Invasion

Au point de vue de propagande, l'invasion du doryphore des 8, 9 et 10 juin a été d'une importance primordiale. Si au début l'on prit cette affaire à la légère, tout en particulier après l'aggravation des conditions climatériques, l'invasion changea tout brusquement. Les articles dans les grands journaux, munis souvent d'énormes vedettes et illustrés de nombreuses photogra-

phies, eurent comme suite qu'à nouveau, le doryphore s'imposa impérieusement à l'intérêt du pays entier. Puisque de nombreux journalistes se donnèrent la peine de se rendre à Wageningen pour rassembler des données techniques plus détaillées sur ce point, le niveau de ces articles fut convenable.

Les conditions climatériques en 1948

La grande influence qu'exerce le temps sur le développement du doryphore, nous force à insister plus longuement aux conditions climatériques de l'été 1948.

Contrairement à l'été de l'année 1947, l'été passé se caractérisa par de fortes oscillations de la température. Cela ressort du graphigue, indiquant le cours de la température maxima du jour de la station d'observation à De Bilt.

Les recherches pratiquées par le Dr de Wilde, ont démontré que la limite de température permettant encore le développement des oeufs, est de 12°C et pour les larves, c'est-à-dire au premier stade de leur développement, de 17°C. Toutes les deux températures sont indiquées dans le graphique par un pointillé horizontal. De ce graphique nous pouvons conclure que, pendant de courts laps de temps seulement, les températures maxima du jour furent de beaucoup supérieures 17°C.

Il y a tendance de considérer l'été 1948 comme un été anormalement froid et humide. Les données de l'Institut Météorologique Royal aux Pays-Bas nous démontrent cependant que ce n'est qu'en partie le cas.

Tableau 1. Température moyenne du jour à De Bilt.

	1948	normal	+	-
mai	14,7°C	14,3°C	0,4	-
juin	17,1°C	16,9°C	0,2	-
juillet	18,1°C	18,4°C	-	0,3
août	17,8°C	17,8°C	-	-

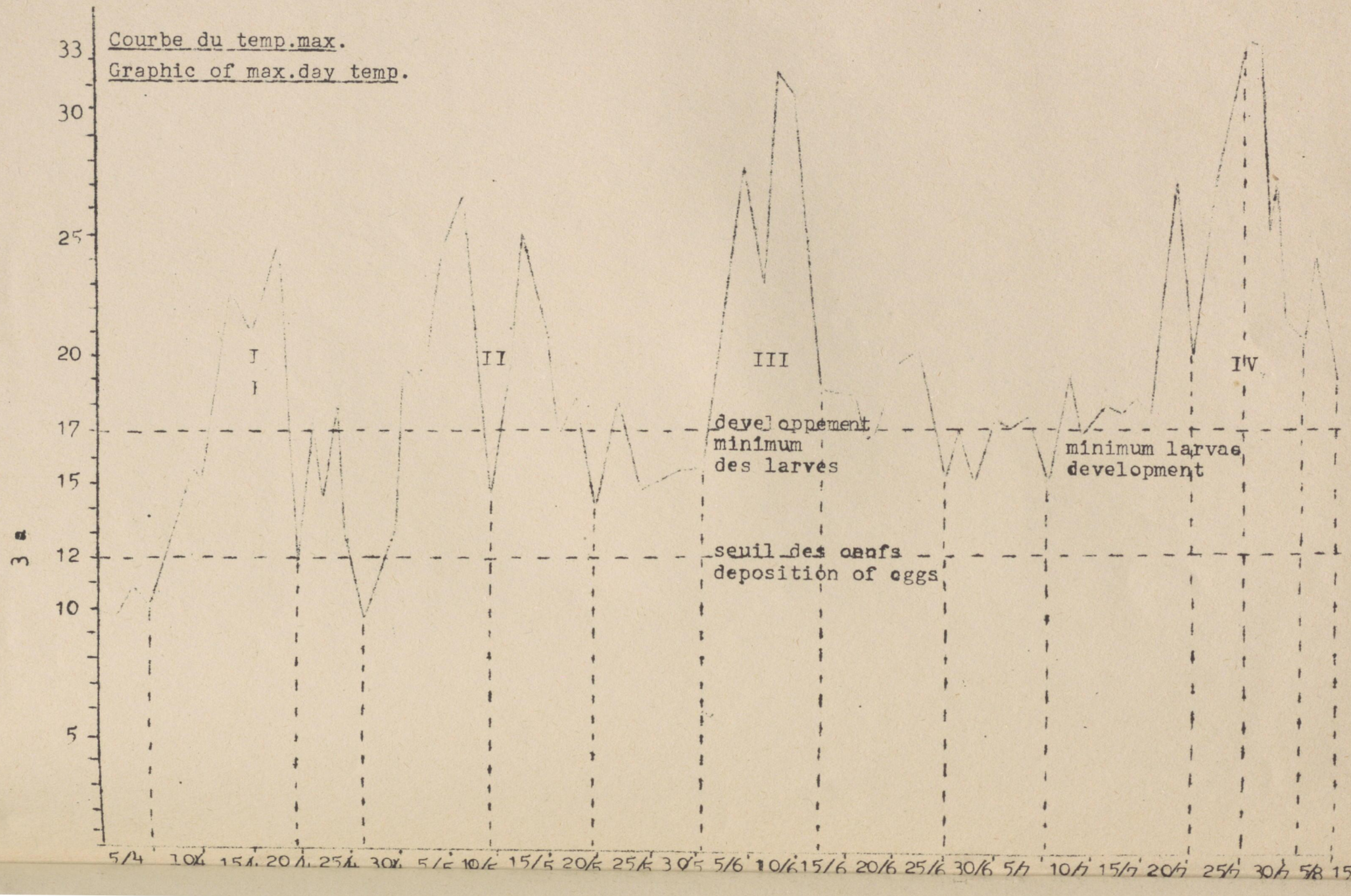
L'été 1948 est donc un été hollandais presque normal et il est, en conséquence, possible de prêter à ce qui suit sur le développement du doryphore, un signification plus générale.

Développement

a. Apparition des doryphores

Fin mars - début avril déjà - se présentent quelques doryphores au-dessus du sol, surtout par suite de travaux de terrassement. Vers le 20 avril (voir la reprod.1, point 1) ce nombre accroît, mais la grande masse apparaît d'abord dans la période de chaleur vers les 10 et 11 mai. Il fut étonnant de voir avec quelle grande promptitude les doryphores ont réagi à cette "vague de chaleur". On signala surtout sur les terres plus froides et humides, plus tard encore l'apparition régulière des doryphores. Suivent ci-après, pour illustrer, quelques dates, où l'on signala les premiers doryphores au champ.

8 avril	Baarle - Nassau
10 avril	Deventer
16 avril	Den Bommel
19 avril	Deurne


Courbe du temp.max.
Graphic of max.day temp.
33
30
25
20
17
15
12
10
5
I
II
III
IV
developpement minimum des larves
minimum larvae development
seuil des oeufs
deposition of eggs
5/4 10/4 15/4 20/4 25/4 30/4 5/5 10/5 15/5 20/5 25/5 30/5 5/6 10/6 15/6 20/6 25/6 30/6 5/7 10/7 15/7 20/7 25/7 30/7 5/8 15/8

21 avril	Eede (Z)
22 avril	St.Michiels Gestel
23 avril	Zevenaar
7 mai	Lemele
8 mai	Holten
10 mai	Emmercompascuum
14 mai	Uithuizen

Ce sont surtout les terres sablonneuses du sud, du centre et de l'est du pays, où l'on signala les premiers doryphores. Ici la position plus au sud n'a pas été de la dernière importance. Le fait que la température du sol détermine l'apparition, explique complètement ce phénomène.

Malgré la circonstance que les hivers doux et humides amènent une grande mortalité parmi les doryphores hibernants, leur nombre fut encore considérable à différents lieux. A une apparition presque simultanée des pousses de la pomme de terre et des doryphores, la jeune végétation en peut subir grand préjudice. Il en fut ainsi sur quelques parcelles cette année.

b. Ponte

La première ponte fut déjà signalée le 4 mai à Baarle-Nassau puis le 8 mai à Diepenveen, ~~le 10 mai à Diepenveen~~, le 10 mai à 's-Heerenberg, le 11 mai à Amerongen, le 13 mai à Naaldwijk, le 14 mai à Coevorden, Pijnacker et Wieringerwerf et le 16 mai à Hoogkerk.

Ces dates détachées de l'ensemble des données, démontrent que la ponte s'est produite, le 15 mai déjà, sur le pays entier. Elle eut partout lieu dans la période chaude du 10 au 20 mai, dans laquelle époque la ponte totale a été très grande, Après la baisse de la température au 20 mai, l'activité de la ponte décrût considérablement, bien que ce soit à un degré moins haut qu'on s'y attendît, pour augmenter enfin fortement dans l'espace du 10 au 15 juin. Après, l'activité de la ponte n'a plus été grande.

c. Larves

Les températures maxima du jour à l'époque du 10 au 20 mai, furent, mise à part une petite interruption vers le 15 mai, de beaucoup au-dessus de 17°C (développement minimum des larves), de sorte qu'on reçut bientôt déjà les premières trouvailles (le 18 mai à Vessem, le 20 mai à Goirle, le 21 mai à Winterswijk, le 22 mai à Hengelo).

En vertu de ces faits et sur base des données de l'Institut Météorologique Royal aux Pays-Bas, on fixa la première période de la pulvérisation obligatoire pour le sud du pays au 24 mai jusqu'au 5 juin. L'affaire prit cependant une tournure tout à fait imprévue. Après la baisse du 20 mai, la température resta jusqu'au 7 juin environ très basse, ce qui provoqua un grand retard dans le développement des oeufs et des larves, accompagné en plus d'une mortalité sensible parmi les oeufs et les larves. La chaleur vers le 10 juin apporta un changement radical dans la situation. Un grand nombre des oeufs pondus dans la période précédente, éclosent et les larves se développèrent rapidement sans subir de grandes pertes par suite de la mortalité. Ça et là se rencontrèrent, en outre, des exemplaires

plus âgés, étant les restes survivants des larves écloses au mois de mai.

Après le 15 juin jusqu'au 20 juillet le rythme dans lequel s'accomplit le processus, subit a nouveau un grand ralentissement.

d. Apparition des doryphores de la première génération

Il résulte de l'aperçu ci-dessous, que les premiers exemplaires apparurent déjà dans la première moitié du mois de juillet.

3 juillet Clinge

5 juillet Ommen

7 juillet Kootwijk

9 juillet Bergschenhoek, Venlo et Deventer

10 juillet Venray

13 juillet Baarle-Nassau et Apeldoorn

14 juillet Maastricht

15 juillet Staphorst

Le nombre des exemplaires trouvés resta cependant restreint et il y a lieu de supposer que ces doryphores proviennent des larfes qui ont survécu l'époque froide du 20 mai jusque début juin. La "grande affluence" arriva cependant d'abord fin juillet et pendant le mois août. Une grande partie de ces doryphores commence, après avoir consommé une quantité suffisante d'aliments d'épargne pendant 10 à 14 jours, le repos hibernal, tandis qu'une autre partie se met à pondre pour commercer ensuite le repos hibernal eux aussi. Ces dernières pontes n'ont pas engendré grand'chose; une très petite partie a pu encore former une deuxième génération complète; c'est-à-dire formé encore des doryphores capables d'hiberner.

Les données sus-indiquées sont exclusivement basées sur les données empruntées à la pratique, et portent, en conséquence, un caractère global. Notamment par la forte dispersion dans la ponte et le développement troublé par suite de la forte oscillation de la température, la situation pendant l'arrière-été est quelque peu embrouillée et il n'est pas bien possible d'en obtenir, de cette façon, une image exacte. Il arrive assez souvent qu'on signale sur une même parcelle tous les stades, l'un à côté de l'autre.

V. Mesures prises et Moyens appliqués

a. Mesures

Comme il a déjà été dit dans le bulletin de communication, no. 734, deux à trois périodes de pulvérisation seraient obligatoirement prescrites pour le pays entier. Les périodes furent fixées pendant la saison comme suit:

24 mai au 5 juin 17 juin au 26 juin 27 juillet au 6 août.	Limbourg, Brabant Septentrional, Zélande et les autres régions situées au sud du Nieuwe Waterweg, Nieuwe Maas, Lek et Rhin.
31 mai au 9 juin 30 juin au 10 juillet 27 juillet au 6 août	Hollande Septentrionale, Hollande Méridionale (au nord du Nieuwe Waterweg etc.) et Utrecht

15 juin au 24 juin Gueldre (au nord du Rhin), Overijssel,
27 juillet au 6 août Drenthe, Groningue, Frise et Ameland

Les Maires doivent être avertis dans le délai de cinq jours au moins avant la date où commence une pulvérisation obligatoire, afin de pouvoir préparer à temps les publications nécessaires.

Pendant une année montrant un cours régulier de la température et par là un développement régulier des oeufs et des larves (1947), la fixation de la période ne fait point difficulté. Dans une année à grandes oscillations (1948) cependant les difficultés qu'offre une pulvérisation obligatoire, sont graves.

Une prévision du temps pour un délai plus long que cinq jours, simplifierait sensiblement la détermination de la période. L'observation de l'obligation d'extermination permettant aux cultivateurs de déterminer, eux-mêmes, la méthode et le moment juste de la lutte (pourvu que celui-ci prenne soin d'une extermination efficace) ne soulève pas ces difficultés et s'avère, en conséquence, fort préférable.

La date où commencerait la première période de la pulvérisation se fixa au début pour les districts du Service Phytopathologique à Apeldoorn, Zutphen, Deventer et Zwolle à une date antérieure à celle mentionée dans l'aperçu. En rapport avec les perspectives tout d'un coup fort défavorables et les rigoureuses gelées de nuit du 20 au 21 mai, on jugea plus judicieux d'annuler cette période, ce qui fut encore justement possible.

Pour d'autres régions, e.a. le Limbourg, il fut jugé nécessaire de prolonger la période, afin de mettre les cultivateurs de pommes de terre dans les possibilités du pulvériser leurs cultures. Le traitement obligatoire dans l'espace du 31 mai au 9 juin dans la Hollande Septentrionale et Méridionale, de même qu'en Zélande (du 24 mai au 5 juin) assura en quelque sorte de la protection contre les doryphores éventuellement évadés, provenant de l'évasion du côté de la mer, les 8, 9 et 10 juin.

b. Moyens

Les moyens préconisés dans le bulletin, no. 736 en date du 16 mars, furent: arséniate de calcium (0,5%), poudres à pulvériser à base de dichloro-diphényl-trichlorméthyl (1% d'un produit de 10%), émulsions de DDT (0,2 - 0,5%) et moyens de pulvérisation à base de HCH, ainsi que les moyens à pulvériser à base de DDT et HCH. Pour les produits à base de HCH on usa de réserve, ceci en rapport avec l'influence éventuelle sur le goût.

Dans les publications répandues par le Maire, concernant une période de pulvérisation, on ne prescrit pas de HCH, sur base de raisons administratives et pour cause du risque qu'on court, en utilisant du HCH, d'influencer le goût. Si l'on voulait néanmoins utiliser du HCH, afin de remplir l'obligation de pulvérisation, cet emploi serait soumis à un permis écrit à accorder par le contrôleur afferent qui avertit l'intéressé à nouveau du danger possible.

Or, on permit cette saison, pour la première fois, à côte de l'arséniate de calcium, l'emploi d'autres moyens. L'application de DDT, notamment d'émulsions, se vulgarise peu à peu.

c. Instruments

Le nombre de pulvérisateurs fut en général plus que suffisant. De concert avec la Commission permanente des états provinciaux de Limbourg, l'Union Agricole et Horticole de Limbourg et le

Service National d'Information Agricole, il fut décidé cependant d'avancer au Limbourg l'achat de petits pulvérisateurs et de poudreuses, en accordant une subvention de l'Etat pour les frais d'acquisition.

VI. L'invasion du Doryphore

Bien qu'une invasion puisse être attendue, en étudiant le cours du temps, elle envahit le pays pourtant inopinément, le 8 juin.

Vers la fin de la première décade au mois de juin, la température monta au-dessus de 27°C. En France il en fut de même. Ajoutez-y encore comme facteur important le fort vent d'est. Par suite du grand vol (au-dessus de 25°C) les doryphores belges et français furent emportés par le vent d'est vers La Manche et la partie dus de la Mer du Nord. Tombés là, ils furent emportés par le courant pour être jetés sur la côte de la frontière belge jusqu'à la plage à Bergen (Hollande Septentrionale).

Sur la côte de l'Estuaire à l'ouest de la Frise, e.a. à Uithuizermeeden, on signala également des doryphores, mais il s'agit ici seulement d'une fraction du nombre, jeté au sud et à l'ouest. Puisque dans la ville de Groningue, qu'on signala aussi quelques doryphores, également vers le 9 juin, il y a lieu de supposer, ceci en partie aussi sur base d'autres données, que l'insecte ait également effectué des vols sur le pays, bien que ce fût, selon toute probabilité, à un degré beaucoup moins intensif.

L'appel fait aux Maires et à la police sur place, n'a pas été en vain. La collaboration peut certainement être nommée excellente. L'appel fait, par l'intervention des Maires, aux écoliers, n'a pas été en vain non plus. Quelques organisations agricoles, les consultations agricoles et horticoles, de même que de nombreux baigneurs s'associèrent énergiquement et promptement aux efforts de détruire cet insecte.

Après avoir promis des récompenses aux écoliers participants - promesse incidentelle au début - et un transport gratuit aux lieux ménaces, cette matière fut ensuite centralement réglée et l'on promit à toute école participante une récompense de fl.25.--, destinée comme contribution aux dépenses à faire pour les jubilés Environ 300 écoles participèrent à la recherche du doryphore.

A dire d'experts, on a détruit environ 90 % des doryphores jetés sur la côte (environ 5.000.000). La longueur des plages et digues battues fut environ 250 km.

Seul dans le district du Service Phytopathologique de Rotterdam (Iles de la Hollande méridionale) furent détruits environ 94.000 doryphores. Même à Stad a/h Haringvliet, le butin fut encore de 6.700 doryphores.

Jeudi, le 10 juin, nouvelle laisse à Hoedekenskerke, où l'on rassembla, ensemble avec la commune de Baarland, environ 20.000 doryphores.

VII. Situation actuelle

Les 500 contrôleurs à titre temporaire ont dressé dans la dernière saison des listes,indiquant la situation des parcelles visitées par eux, en tant que celles-ci furent infectées. Nous disposons, en conséquence, de données d'environ 35.000 parcelles (superficie, nombre évalué des doryphores et/ou des larves, mesures prises etc.) Le nombre de 35.000 parcelles infectées ou qui ont été infectées, est en fait plus grand, parce qu'on

n'a pas visité toutes les parcelles infectées, tandis que les parcelles situées dans les régions gravement infectées, ne sont pas toujours marquées, à la présence d'un suel doryphore. Les parcelles, déclarées complètement libres de l'affection par cet insect au moment où s'effectua l'inspection, ne sont pas marquées non plus.

Sur base d'une élaboration provisoire de ces données, nous pouvons vous donner l'image suivante de l'étendue infectée:(1)

1. Des 1015 communes hollandaises, 220 environ ne sont pas, ou pour un pourcentage inférieur à 1%, infectées.
2. Ces 220 communes sont presque toutes situées dans les provinces de Frise, de Groningue Septentrional et Central, ainsi que dans la partie du nord de Drenthe. Ces régions ne sont donc que sporadiquement infectées.
3. Dans le reste de la province de Drenthe et des Villages dans les Tourbières 2 à 15% de la superficie couverte de la pomme de terre se trouve infecté.
4. Les communes sur les terres sablonneuses d'Overijssel et de Gueldre sont infectées pour un pourcentage de 10 à 25% de la superficie plantée. Dans cette région il y a quelques enclaves qui sont infectées pour plus de 40% (les communes de Rheden, Bergh, Doetinchem et Ede).
5. La situation au Limbourg, et au Brabant Central et Oriental varie assez sensiblement, savoir de 5 à 30%, également avec quelques communes au-dessus de 40% (Leende et environs, Vessem, Veldhoven, Maastricht et Heerlen-Brunsum).
6. La situation en Zélande, exepté la Flandre Zélandaise, au Westhoek de Brabant et dans les Iles de la Hollande méridionale se découvre favorable. La Flandre Zélandaise se trouve infectée de 10 à 15% (IJzendijke et ses environs 40%)
7. La situation en Hollande méridionale, exception faite des îles, et au Utrecht est moins favorable qu'on s'y attendit. Dans les communes de Zevenhuizen, Waddinxveen, Lange Ruige Weide, Vinkeveen, Wilnis, Zeist et De Bilt sont infectées pour un pourcentage de 20 à 30%.
8. Il est indubitablement évident que les différentes communes de la frontière situées tout le long de notre frontière orientale, sont plus gravement infectées que celles situées vers l'intérieur du pays (Dalen/Coevorden 15% Vlagtwedde 8% Onstwedde 4%, Veendam et environs 2%). L'infection s'est donc produite de la zone frontière. Quelques tournées d'inspection au-delà de la frontière hollande-allemande, ont démontré que la situation au-delà de la frontière est moins favorable que dans ce pays. Seul le rapport entre la superficie infectée et le total de l'étendue plantée de pommes de terre, fut, en outre, indiqué. L'intensité de l'infection est laissée provisoirement à l'écart. En général il y a lieu de supposer, que, plus lesdits percentages sont hauts, plus le nombre des doryphores/larves par unité de l'étendue infectée est grand. Il ne faut pourtant pas en tirer la conclusion que dans les communes, ayant un pourcentage égal de superficie infectée de pommes de terre, les parcelles soient toujours infectées, au même degré, par les doryphores/larves.

(1) Lesdits pourcentages représentent le rapport entre la superficie infectée et celle de l'ensemble des terres couvertes de pommes de terre. Ces dernières données sont empruntées au recensement agricole et horticole 1948.

Hollande septentrionale

Une commune dans les terres sablonneuses à l'est et au sud des Pays-Bas, ayant un pourcentage de superficie infectée égal à celui p.e. d'une commune située en Hollande méridionale, aura des parcelles beaucoup intensément infectées que celle située en Hollande méridionale.

Nous y insisterons plus tard, après avoir traité cette matière dans son ensemble. Il y a lieu cependant de supposer, que la situation soit en train de se consolider et que cette consolidation est grandement influencée par les conditions climatériques.

VIII. Projets pour l'année 1949

Le doryphore est un insecte visible et reconnaissable pour tout le monde. Sa lutte peut se réaliser efficacement, en utilisant les moyens et les instruments disponibles. Dans une exploitation bien dirigée, où l'on a clairement conscience de la situation et ou l'on est disposé à mettre de l'argent à sa lutte, le manque à gagner de la moisson n'est jamais à craindre. Là, le doryphore ne menace point la culture de pommes de terre.

Or, une réglementation légale de cette matière ne se justifie que sur base des considérations internationales. Elle offre, en outre, aux cultivateurs de bonne volonté la chance d'être protégés en quelque sorte contre les récalcitrants et les nonchalants.

Il est cependant tout indiqué de diminuer petit à petit l'intervention de l'Etat en cette matière pour aboutir, après un ou plusieurs ans - dès que les rapports internationaux le permettent - à nous borner à l'avis et à l'information dans la presse et par la radio. La lutte doit être alors une affaire de l'intelligence et de l'initiative des cultivateurs. Sous ce rapport nous faisons appel au sentiment de responsabilité des agriculteurs néerlandais.

Lors des discussions qui se sont déroulées en novembre 1948 à Berne, on a fait déjà un acheminement vers ce but. Il fut décidé e.a. de supprimer les pulvérisations obligatoires et protectrices dans les soi-disantes zones frontières de 20 km.et autour des ports. En vertu de cette décision, on peut renoncer pour l'année 1949, à la pulvérisation généralement obligatoire de deux à trois fois de toutes les parcelles couvertes de pommes de terre pour le pays entier. Quelques extrêmes centres d'exportation et peut-être quelques régions gravement infectées dans l'est du pays en sont exceptés. Ceci pour soutenir l'obligation de l'extermination.

Pour le reste, la lutte doit être fondée dur l'article 2 de la Loi, ainsi conçue:"Tout utilisateur d'une parcelle où se trouve le doryphore, est tenu de l'exterminer dans la mesure de ses moyens."Cela implique que chaque cultivateur doit lutter contre le doryphore de la façon qui lui convient le mieux et au moment où il peut atteindre l'effet le plus efficace, à condition qu'il prenne soin d'une extermination efficace.Par l'information dans la presse et par la radio, notamment le "météo" on indiquera, en base des observations, toujours les moments les plus propices où s'effectueront les pulvérisations.Tout cultivateur, qui traite ses cultures au moment juste, dela manière prescrite et avec les moyens exacts deux fois, et dans certains cas trois fois, n'aura rien à redouter du coté du doryphore.

Sur base de cette simplification dans la méthode d'action, les frais de l'Etat peuvent être diminués, ce qui s'exprime e.a. dans une diminution du nombre de contrôleurs actifs dans la lutte contre le doryphore.

Wageningen, le 15 janvier 1949.

ROYAL NETHERLANDS EMBASSY

NETHERLANDS INSTITUTIONS OF SCIENCE AND CULTURE

No.

Royal Academy of Science - Adress : Kloveniersburgwal 29
Amsterdam.

Consisting of 2 departments :
1. Mathematics and Physics ; chairman : prof.dr. A.J.Kluyvers.
2. Historical and literary science; chairman : prof. dr. E.M.Meyers.

Each department has not more than 50 members and 25 foreign members.
The Academy is :
a. An Advisory Body for the government,
b. A centre for scientists in the Netherlands, Indonesia, Surinam and Curacao,
c. A contact-body for Netherlands and foreign scientists,
d. A body for the promotion of scientific researches and enterprises, which can only be effected through the cooperation of scientists, with government subsidy.

x x x

Royal Association "Indisch Institute" - Adress general secretary :
Mr. A.A.Aberson,
Mauritskade 63,
Amsterdam.

The Association is aiming at collecting and studying scientific data, and disseminating knowledge about the Netherlands Overseas Territories in the cultural, economical and hygienical fields. The institute has a famous Indonesian Museum.

x x x

Royal Netherlands Geographical Society - Adress : Herengracht 519,
Amsterdam.

The Society is aiming at :
1. The stimulation of interest for geographical science, with the Netherlands people,
2. The promotion of this science,
3. The stimulation of the spirit of enterprise of the Netherlanders, in the fields of commerce, shipping and industry, by dissemination of knowledge about foreign countries.

x x x

Royal Institute of Engineers - Adress president :
Dr. I.A.Ringers
Prinsessegracht 23
The Hague.

No.

Netherlands Institute for Documentation and Registration.
Adress chairman :
Dr. J.Alingh Prins
Willem Witsenplein 6,
The Hague.

Arranging and normalizing intellectual results, in every field, to make them more accessible. The institute is a member of the "Federation Internationale de Documentation."

x x x

International Institute for Social History - Adress secretary :
Prof. N.W.Posthumus,
Keizersgracht 264,
Amsterdam.

The advancement of knowledge of social history.

x x x

Society of International Affairs - Adress :
Oranjestraat 4,
The Hague.

Factual and historical study of international developments.

x x x

Netherlands Committee for Protection of Nature - Adress secretary :
Dr. P.G. van Tienhoven,
Rokin 92-96,
Amsterdam.

One of the founders of the "Office Internationale pour la protection de la Nature."

x x x

ROYAL NETHERLANDS EMBASSY

No.

ASSOCIATIONS OF ARTISTS AND AUTHORS IN THE NETHERLANDS

Netherlands Federation of Plastic Arts - Adress:
Secretary: J.Haver Droeze,
van Blankenburgstraat 13
The Hague

x x x

Association of Netherlands Architects - Adress:
Chairman: A.J.van der Steur
Weteringschans 12
Amsterdam

x x x

Royal Netherlands Association of Musicians - Adress:
Secrdary: Jos.Smits van
Waesberghe
Hobbemakade 51
Amsterdam

x x x

Literary Association - Adress: Chairman: Prof.Dr.N.A.Donkersloot
Andreas Bannstraat 19 I
Amsterdam

x x x

Netherlands Branch of the International P.E.N.Club

Adress: Chairman: Victor van Vriesland
Laan v.Meerdervoort 94
The Hague

x x x

Academy for Dramatic Art "De Toneelschool"

Adress: Marnixstraat 180
Direcor: W.P.Bos
Amsterdam

x x x

Central Coordinationbureau for the Stage

Adress: Director: Dr.B.Hunningher
Koninginnegracht 12b
The Hague

x x x

ROYAL NETHERLANDS EMBASSY

No.

LIST OF UNIVERSITIES AND ACADEMIES IN THE NETHERLANDS

Universities

Leiden - Adress: Rapenburg # 73
Utrecht - Adress: Domplein 29
Groningen - Adress: Broerstraat 5
Amsterdam (2) Adresses: Oudemanhuispoort 4-6 and Keizersgracht 162-166
Nijmegen (Catholic) - Adress: Wilhelminasingel 13

Academies

Delft (Technical) - Adress: Oude Delft 95
Wageningen (Agricultural) Adress: Heerenstraat 13
Rotterdam (Economical) - Adress: Pieter de Hoochweg 122
Tilburg (Catholic, Economical) - Adress: Bosscheweg 341

x x x

Faculties at the above universities are:

Theology, Law, Medicine, Veterinary Science, Mathematics and physics, Philology and Philosophy (subdivided into classics, Netherla Roman, German, Slavonic, Semitic, Indo-Iranian, Indonesian and Chinese-Japanese).

Delft Academy has faculties of: civil engineering, construction engineering, mechanical engineering, shipbuilding, airplane building, electrotechnical engineering, chemical engineering, mining, geodetical engineering.

Wageningen Academy has faculties of: Netherlands agriculture, tropical agriculture, Netherlands and tropical forestry.

Rotterdam and Tilburg Academies have faculties of: economical sciences, social sciences, accountancy.

x x x

ROYAL NETHERLANDS EMBASSY

No.

STUDENT'S ASSOCIATIONS

Netherlands Bureau for Foreign Students Relations

Adress: Societeit Minerva
Breestraat
Leiden

x x x

International Student Service

Adress: Korte Nieuwstraat 10
Utrecht

x x x

M.S. Swaminathan

The Phytopathological Service.

The Phytopathological Service in the Netherlands has been instituted in view of the requirements that are made in several countries with regard to the conditions of health of plants and parts of plants to be imported. In order to meet these requirements official inspection machinery was needed, which was formed in 1898 on a moderate scale. This Service developed gradually in proportion to the increasing demands abroad and the ever-extending exports. The control on the state of health of the export products led to the insight that a simple inspection of the nurseries, working for export, would not suffice, but that an inspection of each consignment combined with information given at the nursery was essential to be able to grow the crops in such a state of health that the products comply with reasinable requirements.

With a view to maintain exportation a few diseases that are most to be feared have given direct or indirect rise to the issue of legal regulations to combat and prevent their spreading. Legal provisions for importation were successively considered indispensible to safeguard arable crop farming in the Netherlands. Naturally it was also the Phytopathological Service that was charged with the enforcement of these provisions.

In this way developed the extensive task, which the Phytopathological Service has now to fulfil. Consequently this task is mainly twofold. Primarily it consists in guarding and promoting the health of the arable crops and stored products in order to improve the yield both in quantity and in quality; secondly it excersises control on the observance of all legal obligations that are valid at home or have been laid down with regard to our export items abroad. The former activities are performed in conjunction with other institutions active in the agricultural and horticultural field, notably the Agricultural and Horticultural Advisory Services, each of which has at its disposal an extensive staff to take care of the individual information.

In order to fulfil its task the Phytopathological Service has at its disposal a great number of officials, stationed at the head-office at Wageningen or at one of the 34 stations spread all over the country. The Service is run from the head-office, where besides the management are to be found laboratories for scientific research, the library, the central administration and also rooms for technical work. In addition there are near the building experimental and demonstration grounds with an area of $1\frac{3}{4}$ hectares (4.4 acres).

In behalf of the inspection the Netherlands is divided into 6 districts which again are divided into a total of 34 areas. These have been delimitated in such a way that there is always a sufficient number of experts at hand in all districts from where considerable exports take place, or where intensive information

formation is wanted. One technical higher official for agricultural affairs and one for horticulture, supervise the outdoor staff, and receive their instructions direct from the Direction. Their main responsibility is to bring uniformity in the duties of the outdoor staff officers in connection with the inspection of the state of health of the export items and the issue of the certificates that are required when importation into the various countries takes place.

These officials have enjoyed a secondary agricultural and/or horticultural education and have gained extensive experience in the field of plant diseases and pests. They bear the tital of technical officer or inspector. In several activities, including inspection and combating the colorado-beetle, they are assisted by casual personnel who have not had a specific education but who have ample practical experience (so-called assistent-inspectors or colorado-beetle inspectors).

If possible the inspection of the health of the export-products involves the whole or at any rate a very substantial part of the consignment. Inspection takes place when the consignment is being prepared for exportation, i.e. for the greater part in the stores where the packing is done. If the product and the method of shipment so allow, as in the case of potatoes, inspection is carried out, while they are being loaded. If the goods are sent by sea, they are submitted to a final inspection in the shipping port. Not until the goods have passed this final inspection is a certificate issued. At this inspection due note is taken of the health, if necessary, portions of the parcels to be shipped are condemned, directions are given about better grading and removal of diseased parts. The observance of these instructions is checked before definite approval and issue of the certificate take place.

The inspection is primarily directed towards the requirements made in the country of destination. With a view to this the Phytopathological Service is kept posted of all provisions bearing on this matter, on which the instructions to the officials are based. In addition there are in virtue of the Agricultural Exportation Act several legal provisions with regard to the health conditions of the export-products, irrespective of the requirements of the country of destination.

Under these regulations flower-bulbs and woody nursery products when exported, must always meet strict requirements with regard to health, also when they are destined for countries which have not set special standards in this respect, or whose standards are only restricted to one or more named diseases.

When products are to be exported the Netherlands Customs-Officers make sure whether the transport permit is present. This is issued by the officer of the Phytopathological Service as a proof that the consignment has been passed by him.

Though, in principle, it does not constitute a part of their duties, the officers of the Phytopathological Service are charged with

with the quality inspection of flower-bulbs and potatoes, as already they have to test all consignments on the presence of diseases and noxious insects.

It is essential that these activities are supported by good general information regarding the combating of plant diseases. This cannot be restricted to the nurseries where the crops destined for exportation are grown; it covers the whole agricultural and horticultural field. Rigid combating of diseases is also essential, on the ground of the intensity with which the Netherlands Agriculture and Horticulture are carried on. To be able to come on the market with choice products, the grower requires many-sided information.

In conjunction with the above-mentioned Agricultural and Horticultural Advisory Service the Phytopathological Service gives this information on all sorts of injury to plants, including those which are caused by vegetable of animal parasites or soil conditions and other causes together with damage done by weeds. If the cases of damage to stored goods and the questions on means and instruments of combat are added to this, an approximate idea may be obtained of the extensiveness of this field of activities.

One of the Sections of the Agriculture Division of the Ministry of Agriculture, Fisheries and Food is the Bureau of Phytopathological Affairs. The head of this Bureau is also the Director of the Phytopathological Service. This Service, henceforth to be referred to as the P.S., consists of a head office and an outdoor staff.

The head office at Wageningen houses the scientific and administrative staffs. These include the sections Agriculture, Horticulture, Inspections and Legal Measures, Research on Pest Control Products, Vertebrates, Diagnostics, Documentation and the Finance and Administration Section.

As already previously stated, the task of the P.S. is twofold:

a the carrying out of inspections on the basis of Dutch laws and regulations, and inspections required by importing countries;
b all such activities that are generally connected with the repulsion and control of plant diseases and pests.

The activities listed under b can be summed up as follows:

A Protecting the state of health of agricultural, horticultural and arboricultural crops in general.

The large number of officers in the outdoor service makes it possible to keep a watchful eye on the state of the crops troughout the country. This is of special importance in connection with new infestations and with alarming spread of familiar diseases or pests.

The

The branch offices report fortnightly to the head office. Serious infestations are immediately reported. This makes it possible for the phytopathologists of the Agricultural and Horticultural Section at any time to form an opinion of the situation throughout the country, thus enabling them to decide wether or not action should be taken. These sections may issue warnings, give advice or propose legal steps. The latter are composed by the Inspections and Legal Measures Section, in co-operation with the Legal Branch of the Ministry, the jurist of the Phytopathologic Affairs Section acting as a contact man.

In this respect mention should be made of the regular warnings of the P.S. as to the most suitable dates for spraying and other control measures.

It is often very difficult for farmers and market gardeners to determine these dates. Therefore the officers of the P.S. make regular field observations, which are translated at the head office. Since the weather conditions form an important factor, there is a close contact with the Royal Meteorologic Office at De Bilt, Section Agricultural Meteorology.

The warnings are generally given in the so-called "weather-talk" which is broadcasted daily at 12.30, 17.45 and 18.45, but also via the press.

There are also regional warning services, which are taken care of by regional authorities, generally falling under the Agricultural and Horticultural Advisory Services of the Ministry.

The P.S. regularly issues the following warnings:

1. Winter spraying of fruit trees and woody nursery stock: to be started in mid-January.

2. Currant Shoot Borer (Incurvaria (Lampronia) capitella Cl.): spray before February.

3. Scab in apple and pear (Venturia inaequalis Wint. and V. pirina Aderh.): 1st and 2nd spraying when trees are likely to be infested; is dependent on the development of the fungus and the weather conditions.

4. Blight (Phytophthora infestans Debary): When the weather has been critical for an outbreak.

5. Colorado beetle (Leptinotarsa decemlineata Say.): development is investigated in cages and observatory fields; on this basis the right combating periods are issued.

6. Disinfection of seeds: at times attention is called to the necessity of disinfecting the seeds of cereals, peas, flax, legumes etc.

7. Apple Blossom Weevil (Anthonomus pomorum L.): spray in swelling and breaking stage,

Strawberry

8. Strawberry Blossom Weevil (Anthonomus rubi Hbst.): as soon as the weevils become actif and the first damage has been observated.

9. Plum Sawfly (Hoplocampa flava L. and H. minuta Christ.): at the end of the flowering stage.

10. Pear Sawfly (Hoplocampa brevis Klug.): at the end of the flowering stage.

11. Apple Sawfly (Hoplocampa testudinea Klug.): at the end of the flowering stage.

12. Cabbage Fly (Chortophila brassicae Bché): April.

13. American Gooseberry Mildew (Sphaerotheca mors-uvae Berk.): spray in the first half of May.

14. Gooseberry Sawfly (Nematus (Pteronus) ribesii Scop.): 1st generation of larvae at the end of May; 2nd generation in July.

15. Red Plum Maggot (Grapholita funebrana Tr.): spray immediately after the eggs have been laid.

16. Raspberry Weevil (Byturus tomentosus Fab. and B. fumatus Fab.): the crop to be sprayed 10 days after opening of the first flowers.

17. Cabbage top (Contarinia torquens de Meyere): general warning at the end of May, followed by three warnings, 1st generation etc.

18. Asparagus Fly (Platyparea poeciloptera Schrk.): infested haulms to be destroyed before June 15.

19. Leaf Spot of Currants (Pseudopeziza ribis Kleb.): after harvest.

20. Pests of Colza:
Cabbage Stem Flee Beetle (Psylliodes chrysocephala L.), September;
Pollen Beetle (Meligethes aeneus F.), spring;
Cabbage (Swede) Seed Weevil (Ceuthorrhynchus assimilis Payk.), spring.

21. Cabbage caterpillar (Pieris brassicae L. and P. rapae L.): first generation mid-July.

22. Snails: throughout the summer.

Silver

23. Silver leaf disease (Stereum purpureum Pers.): dead wood to be removed before the beginning of September.

24. Pear Blossom Weevil (Anthonomus pyri Koll.): early part of September.

25. Winter moth (Cheimatobia (Operophtera) brumata L.): glue rings to be applied before October 15.

26. Asparagus Fly (Platyparea poeciloptera Schrk.) and Asparagus Rust (Puccinia asparagi D.C.): foliage to be removed before December 1.

27. Cutting out caterpillar nests during the winter.

28. Cutting down and destruction of dead fruit trees.

The sudden occurrence of certain pests may sometimes necessitate research work to make an instant control possible. This research work may be performed by the Agriculture and Horticulture Sections. If a more fundamental research should be necessary, it is done by individual research workers, who will shortly be united in an Institute for Research on Plant Diseases and Pests.

The Agriculture Section of the P.S. at present pays special attention to the control of the Colorado beetle, Potato Root Eelworm (Heterodera rostochiensis Wollenweber), weeds and disinfection of seeds.

The Horticulture Section makes a special study of diseases caused by deficient or excessive application of certain elements, while the study of virus diseases that are of frequent occurrence has been taken in hand.

B Enforcing laws and by-laws prescribing measures against plant diseases.

This work is directly based on the activities referred to above. To-day the following acts are in force:

Plant Diseases and Pests Act (Gazette 1921 No.4); amendments to this act are in preparation.

Bulb diseases Act 1937 (Gazette No. 639 L.).

Potatoes Act 1935 (Gazette No. 242).

Colorado Beetle Act 1947 (Gazette No. 4 220).

Muskus Rat repulsion and control Act 1930 (Gazette No. 443).

Insecticides and Fertilizers Act 1947 (Gazette No. H 123).

Asparagus Fly Act 1948. (Gazette I 206).

Recently a Bill for the control of Potato Root Eelworm was introduced in the Second Chamber of the States General.

C Promotion of the advisory work and general propaganda in the phytopathological field.

In the Netherlands a distinction is made between direct and indirect, or impersonal, advisory work.

The direct advisory work is looked after regionally by advisers, who fall under the Agricultural and Horticultural Information Services. These advisers or their assistants pay regular visits to the holdings, the occupiers of which may obtain expert opinion from them. Their task more or less resembles that of a family doctor.

The P.S. acts as a specialist in the field of plant diseases. This service instructs the advisers in special cases. In such cases an agricultural and a horticultural adviser for plant diseases act as liaison officers. Their office is in the building of the P.S. The P.S. moreover takes care of the general national advisory work, including broadcasts, press reports, exhibitions and lectures. This service also provides preparations, which will serve as study material in agricultural and horticultural schools.

D The Research on Pest Control Products Section is charged with supervising the make-up and potency of products for the control of plant pests and diseases. This task is based on the act referred to under B.

For this purpose there is a chemical laboratory, as well as two biological laboratories, including one for the research on insecticides and one for fungicides.

Besides research work carried out in the laboraties, field experiments are made, either on the farms, or on experimental plots specially laid out for the purpose. The outdoor staff takes part in these experiments. Standard methods of analysis have been partly worked out; their further elaboration has been taken in hand.

E Studying noxious birds and mammels and giving directions for their control.

This work is taken care of by the Vertebrates Section, which is subdivided into an ornithologic branch and a branch for the study and control of rodents.

The task of the ornithologic branch comprises the organisation of the control of noxious birds, including crows, rooks, woodpigeons and sparrows. It also makes propaganda for the protection of beneficial birds, e.g. by placing nest boxes.

This branch is likewise included in the enforcement of the Birds Act 1936, Gazette 700 and the Game Act 1923, Gazette 331.

The

The life of various birds that are of economic significance is studied. Nation-wide drives for the control of rodents are organized by the P.S. with the assistance of municipal cleansing departments and similar institutions. These drives are so organized that poisoned baits (on a Scilla basis) are distributed over large areas of the country. Rat proofing is likewise studied, e.g. the rat-proofing of buildings. Rodenticides are investigated by the P.S., to comply with the Insecticides and Fertilizeract, and biologically tested on specially breeded white laboratory rats and caught wild rats. The biology of the different species of rats and mice is carefully studied.

Of late years a good deal of attention has been paid to the musk rat, which is found in the south of the country.

F To give advice in the matter of infestations, with which one is not familiar, or which are not recognized.

Any person can send diseased plants or parts of plants to the P.S. in order to have the nature of the disease or pest ascertained. In this case/P.S. prescribes the means of control/the which can be best applied. This work is mainly looked after by the Diagnostic Section which has for this purpose enlisted the services of a few mycologists and entomologists. Many avail themselves of this opportunity, including the Government Information Services, farmers and market gardeners, Private individuals, too, often seek the advice of this section.

G Compiling a central documentation in the phytopathological field.

The P.S. is the central plant pathological authority. The Documentation Section undertakes to record all information which is easily accessible. It also takes care of the photo studio and the photographic files.

H Miscellaneous duties.

1. Research of new potato varieties in respect of resistance to wart disease.
2. Laying out demonstration experimental fields for educational purposes.
3. Giving advice in connection with infestations of stored products.

Other activities:

Since the P.S. is the central institute in the field of plant diseases, it would be only natural if this service should supervise, or at least exercise influence on other institutions active in the same field. These are mostly semi-official institutions. They include:

Institute

Institute for Research on Plant Diseases.

This Institute will eventually take care of all research work in the field of plant diseases. Its definite organization has not yet been completed, but the Director of the P.S. will be on the Board.

General Netherlands Inspection Service for Agricultural Seeds and Seed Potatoes (by abbreviation of the Dutch name: NAK).

The Director of the P.S. supervises the activities of this institute. In its essentials this task includes:

1. Promoting the production and utilization of reliable propagating material and the improvement of propagating material of crop plants.
2. Execution of legal provisions, as far as it is charged with their execution. For this purpose the NAK supervises the production of propagating material (the so-called field inspection), lays down inspection standards, gives advice to both government and private persons, and if necessary gives financial aid to institutions that are active in the same field.

Inspections of seeds and seed potatoes are carried out by 13 regional inspection services which are supervised by the NAK.

The General Netherlands Inspection Service for Vegetable Seeds (NAK-G) was established for the seeds of market garden crops; the General Netherlands Inspection Service for Woody Nursery Stock (NAK-B) for woody nursery products; the General Netherlands Inspection Service for Ornamental Plants (NAK-S) for ornamental plants.

The task of the institutions is the same as that of the NAK mentioned above. They inspect quality and trueness-to-type.

As far as inspections are concerned there is a close cooperation between P.S. and these inspection services.

M. S. Swaminathan

The Institute of Plant Breeding at Wageningen.

The Institute of Plant Breeding (I.v.P.) belongs to the Agricultural University. It is situated on the highway Wageningen - Grebbeberg (Rhenen).

Program of work for 1949.

1) Instruction to students.

The lectures on plant breeding are completed by visits to the trial fields of the Institute. Students are acquainted with the scientific research done by the Institute's collaborators attached to the Agricultural University and by other investigators stationed at the Institute. The library of the I.v.P. possesses an almost complete collection of publications in the field of plant improvement, which have been systematically catalogued.

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The scientific research is directed especially towards fundamental problems related to plant breeding. Among other things are studied the physiological differences between varieties, cytology, interspecific crosses (potatoes), intergeneric crosses (wheat x rye), mutations (colchicine treatment), heterosis (beets), disease resistance (potatoes).

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A collection of varieties (used as parents in crosses) and hybrid populations are maintained, as well as the varieties developed by the Institute.

Increasers of the Institute's varieties receive "breeder's seed" for increase to "original seed".

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The Institute supplies breeders and aspirant breeders with hybrid populations. Their varieties are examined also on the fields of the Institute. Crosses are made on behalf of potato breeders.

Contact with the business world expresses itself in the organizing of breeder's days and excursions to breeding establishments. The secretariat of the Study Club for Plant Breeding and of the Dutch Association of Plant Breeders are located at the I.v.P. There is a close collaboration with different institutions (Council of the Legislation on Plant Breeding, Applied Physical Research, Institute for Rational Sugar Production, General Netherlands Inspection Service for Field Crops and Seed Potatoes, Government Committee for the Compilation of the List of Varieties of Field Crops and various other institutions and organizations).

In 1924 the first Descriptive List of Varieties of Field Crops was edited here under the direction of Prof. Ir C. Broekema. Since 1943 the Institute of Research on Varieties of Field Crops is taking care of the List of Varieties.

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The I.v.P. extends hospitality to the Foundation for Plant Breeding (secr. Ir G. Veenstra) which will take over part of the task of the I.v.P.. This Foundation has started already its breeding work with potatoes, grasses, clovers, fodder lupin and a few

other crops.

As the collaboration between the I.v.P. and the Foundation for Plant Breeding is very close the members of the staffs of both institutions who are working here are listed together.

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Agricultural Research : Prof.Dr J.C.Dorst,Dr H.de Haan ,Ir G. Veenstra.

Cytology : Dr G.Bremer.

Plant Physiology : Dr A.E.H.R.Boonstra,Mrs Dr D.E.Bremer-Reinders,Ir D.Kloen,Ir L.Voskuyl.

Rye Breeding Research : Dr F.P.Ferwerda.

Disease Resistance in Potatoes: Dr H.J.Toxopeus,Ir G.A.Thijn, Ir H.T.Wiersema.

Lupin Breeding Research : Ir H.Lamberts.

Grass and Clover Breeding Research :Dr F.Wit.

Library : H.Jansen ,L.A. van Melle M.S.

6) Demonstration.

All round the building are trial fields (among others a trial field with grasses and clovers),while inside the building a show has been arranged to illustrate the plant - breeding work done in the Netherlands.

M. S. Swaminathan

Plantenziektenkundige Dienst
Wageningen

Wageningen, Mei 1949

Bericht no. 817

BESTRIJDING VAN DE AARDAPPELZIEKTE

(Phytophthora infestans)

De aardappelziekte kan grotendeels worden voorkomen door tijdige en herhaalde bespuiting van het gewas met een der volgende middelen:

BORDEAUXSE PAP EN BOURGONDISCHE PAP

Deze middelen worden bij de eerste bespuitingen gebruikt in een oplossing van 1,5%; bij de volgende behandelingen wordt het percentage opgevoerd tot 2,25.
In werking staan Bordeaxse en Bourgondische pap nog bovenaan. Een van de voordelen is, dat de bespuiting minder vaak herhaald behoeft te worden dan bij gebruik van de andere middelen. Daarentegen echter lossen de andere middelen gemakkelijker op, waardoor de kans op verstopping van de spuitdoppen kleiner is.

KOPEROXYCHLORIDEN.

De koperoxychloriden zijn onder verschillende namen in de handel. Het zijn fijn gemalen koperverbindingen, die alle 50% koper bevatten. Ook bij deze middelen is het gewenst, eerst met een weinig water een papje te maken en daarna de rest van het water toe te voegen; er is dan minder gevaar voor verstopping van de spuitdoppen.
Voor de eerste behandelingen gebruike men een oplossing ter sterkte van 0,7-0,8%, voor de latere bespuitingen een oplossing van 0,9-1,1%.

KOPEROXIDUUL

De beide thans verkrijgbare merken, Koper-Sandoz en Perenox, bevatten 50% koper. Perenox wordt verspoten in een oplossing van 0,6%; later wordt de concentratie verhoogd tot 0,8%; bij deze hoge concentratie echter bestaat er kans op beschadiging van het loof.
Van Koper-Sandoz is voor de eerste bespuiting een oplossing van 0,4% voldoende, maar voor de latere behandelingen is een 0,6% oplossing nodig.

DITHANE Z 78, is een nieuw middel, waarmee in Nederland nog weinig ervaring is verkregen. Bij een aantal aardappelrassen(echter niet bij alle) blijven de planten na bespuiting met Dithane langer groen. Hierdoor wordt, vergeleken met andere middelen, soms een hogere knolopbrengst verkregen. Er moet echter rekening mee worden gehouden, dat, door het langer groen blijven van de planten, de kans op aantasting door Phytophthora aan het eind van het seizoen groter is. Blijft het loof langer groen, dan is het bij gebruik van Dithane nodig, langer door te spuiten om te voorkomen, dat de aardappelziekte aan het eind van het seizoen toch nog schade aanricht.
Voorlopig kan voor de eerste bespuiting met Dithane Z 78 een oplossing van 0,18% worden aangeraden; in de loop van de zomer moet de concentratie verhoogd worden tot 0,24% (voor de eerste bespuiting dus 1,8 kg en voor de latere 2,4 kg Dithane Z 78 per 1000 liter spuitvloeistof).

De grootste kans op succes bij de bestrijding bestaat, wanneer de planten, vanaf het tijdstip dat het gewas zich aaneen gaat sluiten, of zoveel eerder als het nodig is in verband met waarschuwingen van De Bilt, doorlopend met een laagje pap zijn bedekt. Het is vooral nodig om goed te spuiten; ieder plant moet met een laagje pap worden bedekt.

Z.O.Z.

HET STUIVEN

Bij het gebruik van stuifmiddelen tegen de aardappelziekte moet er rekening mee worden gehouden, dat men twee maal moet stuiven, tegen één keer spuiten. Maar ook dan blijft het resultaat dikwijls beneden de verwachtingen. Bovendien zijn de kosten van een bestuiving aanmerkelijk hoger dan die van een bespuiting. Onder normale omstandigheden verdient dus het spuiten de voorkeur boven het stuiven. Echter, wanneer er wegens het ongunstige weer niet gespoten kan worden, of wanneer in een lange regenperiode de grond onbegaanbaar is voor een spuitmachine, kan het aanbeveling verdienen tussen twee bespuitingen in te stuiven: het is beter iets ter bestrijding van de ziekte te doen dan geen maatregelen te nemen.
Van de koperhoudende stuifmiddelen die thans in de handel zijn, is per bestuiving 25 kg. per ha. nodig.

Om ziekte in de knollen zoveel mogelijk te voorkomen mag niet gerooid worden bij regenachtig weer en(of) natte grond. De kuilen mogen nimmer (ook niet tijdelijk) bedekt worden met aardappelloof.
Soms kan het voordelig zijn een ziek gewas door doodspuiten te doen afsterven. Weliswaar is het niet gemakkelijk om een nog vrij groen gewas geheel dood te spuiten, maar wanneer het gedeeltelijk afsterft is reeds veel bereikt. Het gewas wordt meer "open", zodat er geen broeierige atmosfeer in kan ontstaan, terwijl tevens de grond snel kan opdrogen.
Het doodspuiten kan ook dienen om later in het seizoen een begin van aantasting in het loof te stuiten.
Het gewas kan doodgespoten worden met + 800 l per ha van een oplossing van één der volgende middelen (in alphabetische volgorde): Aamorta 2% opl.; D.N.C. Krimpen extra; Elgetine; Jebonol extra; Kewa perfect; Niptonpoeder; Shell Nitroleum; Super Elgetol alle in 1,5-2% oplossing, en Trifobloc 1,5% oplossing (6 blokken per 100 liter).

Verzonden aan Lijst A,B,Ia,IIa,IIIa t/m g, IVb,VII,VIIIc.

9

320,-
20
20

360
20
20
20

420

M.S. Swaminathan

Seventeenth Annual Report of the N.A.K.-covering the period 1948/49.

The annual report of 1948/49 treats the organization and activities of the management and the executive committee, the work of the committees, the secretariat and the administration, experiences connected with the inspection of farm crops and finally the execution of the Breeder's Decree.

The supplements contain surveys on the organization of the N.A.K., the finances, the acreages submitted for inspection and certified, the quantities sealed and the payment from the Breeder's Compensation Fund.

The total receipt has been f 337.704.-, against f 449.577.- in 1947/48, that is to say a decrease of f 111.873.-. The total expense amounted to f 349.472.-, against f 374.383.- in 1947/48, that is to say f 24.912.- less. This shows that the considerable reduction in receipts has tipped the scale to the debit side.

The number of certificates and declarations amounted to 17.344.100 of 302 different kinds, 15.115.000 seals and about 17 million labels.

Of the seed potato crop 34.989 ha. were approved which is 73.3% of the submitted acreage. The following table shows for the principal varieties the number of hectares of the various classes that were certified.

	AA	A	AB	B	C	EG	Total
Bintje	-	7.762	3.701	1.919	1.323	180	14.885
Eersteling	-	3.458	847	317	112	42	4.776
Eigenheimer	-	1.173	412	1.241	637	83	3.546
Voran	358	738	887	2.067	665	135	4.850
Together	358	13.131	5.847	5.544	2.737	440	28.057
Other varieties	380	2.257	1.406	1.769	929	191	6.932
Total 1948	738	15.388	7.253	7.313	3.666	631	34.989
Percent	2.1%	44%	20.7%	20.9%	10.4%	1.8%	100%
Total 1947	804	18.196	5.935	13.750	5.600	302	44.604
Percent	1.8%	40.8%	13.3%	30.8%	12.5%	0.7%	100%

Sealed were 369.267 metric tons, of which 273.393 tons were exported, chiefly to France, Belgium and Luxemburg (about 215.000 tons).

Of the cereals, pulses and other farm crop seeds 95.822 ha. were inspected; of the forage crops and various other crops 6.401 ha. The following acreages were approved. After the areas expressed in hectares the percentage of rejected crops is mentioned.

Crops	Original seed approved	% rejected	Once grown and further propagations approved	% rejected	Local variety approved	% rejected	Total approved	% rejected
Winter wheat	1.950.96	3.8	19.100.08	11.2	-	-	21.051.04	10.5
Winter barley	136.25	6.2	1.115.79	20.6	9.38	-	1.261.42	19.2
Winter rye	1.989.69	1.8	15.291.68	5.7	7.30	7.6	17.288.98	5.3
Spring wheat	299.10	4.6	2.816.59	9.1	-	-	3.115.69	8.7
Spring barley	386.22	9.4	8.528.41	10.6	-	-	8.914.63	10.5
Spring rye	11.--	-	0.75	72.-	-	-	11.--	14.5
Oats	1.216.21	8.9	13.997.39	10.5	94.97	25.7	15.308.27	10.5
Flax	1.311.15	5.8	7.814.38	8.3	-	-	9.125.53	7.9
Pulses	1.029.75	5.-	8.750.80	9.4	372.38	3.6	10.152.93	8.8

The quantities of exported seed were: wheat 12.996 metric tons, flax seed 7.518 tons, peas 7.518 tons, oats 6.948 tons, sugar beet seed 4.828 tons, beaus 4.173 tons, barley 3.227 tons, rye 2.241 tons and small quantities of grass and clover seed.

The Breeder's Compensation Fund has made the following payments:

Funds	Harvest 1947	Harvest 1946	Total
Potatoes	f 72.153.59	f -	f 72.153.59
Cereals and Pulses	" 314.535.85	" -	" 314.535.85
Flox seed	" 28.882.34	" -	" 28.882.34
Maize	" 625.03	" 7.50	" 632.53
Oil seed crops	" 5.848.29	" 9.596.36	" 15.444.65
	f 422.045.10	f 9.603.86	f 431.648.96

Moreover for the maintenance of local varieties a sum of f 1.392.- was paid.

For further detail the supplements to the annual report may be consulted.

NEDERLANDSCHE ALGEMEENE KEURINGSDIENST

B o s t b u s 5

WAGENINGEN - Holland

Schema en tarief voor de kwekersvergoeding of -beloning, uit te keren krachtens artikel 43 resp. artikel 46 van het kwekersbesluit 1941 (oogst 1949).

M.S. Swaaneveld

1. AARDAPPELEN.

a. Algemeen.

De kwekersvergoeding of -beloning bedraagt, per goedgekeurde ha. pootaardappelen, behoudens het bepaalde onder b. van dit nummer en onder de nummers 8 en 9:

	Aantal jaren dat het ras in het verkeer was per 30/4	Voor de 1e 500 ha. p. goedgek. ha.	Voor de 2e 500 ha. p. goedgek. ha.	Voor de volgende 2000 ha. p.ggk.ha.	Voor de verdere opp. p. ggk. ha.
I.	1 - 15 jaar	f 12.50	f 10.--	f 5.--	f 1.--
II.	16 - 25 jaar	" 10.--	" 5.--	" 2.50	" 1.--
III.	26 jaar en langer	" 5.--	" 2.50	" 1.--	" 1.--

b. Knopmutant.

Indien een ras is ontstaan door knopmutatie, bedraagt, behoudens het bepaalde onder de nummers 8 en 9, de vergoeding of beloning een vierde deel van het krachtens het bepaalde onder a. te genieten bedrag, met uitzondering echter voor het ras Rode Eersteling, waarvoor de vergoeding of beloning wordt bepaald op de helft van het krachtens het bepaalde onder a. te genieten bedrag.

2. GRANEN EN PEULVRUCHTEN.

De kwekersvergoeding of -beloning per 100 kg. uiteindelijk goedgekeurde nabouw bedraagt, behoudens het bepaalde onder de nummers 8 en 9:

a. voor zelfbestuivende gewassen:

	Aantal jaren dat het ras in het verkeer was per 30/4	Voor de 1e 1000 ton per 100 kg.	Voor de 2e 1000 ton per 100 kg.	Voor de volgende 2000 ton p.100 kg.	Voor de verdere hoeveelh. p.100 kg.
I.	1 - 15 jaar	f 1.--	f 0.50	f 0.25	f 0.10
II.	16 - 25 jaar	" 0.50	" 0.25	" 0.25	" 0.10
III.	26 jaar en langer	" 0.25	" 0.25	" 0.25	" 0.10

b. voor kruisbestuivende gewassen:

	Aantal jaren dat het ras in het verkeer was per 30/4	Voor de 1e 1000 ton per 100 kg.	Voor de 2e 1000 ton per 100 kg.	Voor de volgende 2000 ton p.100 kg.	Voor de verdere hoeveelh. p.100 kg.
I.	1 - 15 jaar	f 1.--	f 0.50	f 0.25	f 0.10
II.	16 jaar en langer	" 0.50	" 0.25	" 0.25	" 0.10

3. VLAS.

De kwekersvergoeding of -beloning bedraagt per 100 kg. uiteindelijk goedgekeurde nabouw, behoudens het bepaalde onder de nummers 8 en 9:

	Aantal jaren dat het ras in het verkeer was per 30/4	Voor de 1e 500 ton per 100 kg.	Voor de 2e 500 ton per 100 kg.	Voor de volgende 1000 ton p.100 kg.	Voor de verdere hoeveelh. p.100 kg.
I.	1 - 15 jaar	f 3.50	f 2.50	f 1.50	f 0.50
II.	16 - 25 jaar	" 2.--	" 1.50	" 0.75	" 0.25
III.	26 jaar en langer	" 1.--	" 0.75	" 0.50	" 0.25

4. MAIS.

De kwekersvergoeding of -beloning per 100 kg. uiteindelijk goedgekeurde nabouw bedraagt f 2.-.

5. HANDELSGEWASSEN.

I. Blauwmaanzaad, mosterd- en karwijzaad.

De kwekersvergoeding of -beloning bedraagt per 100 kg. uiteindelijk goedgekeurde nabouw f 2.-.

II. Koolzaad.

De kwekersvergoeding of -beloning bedraagt:

a. per 100 kg. te velde en op partij goedgekeurde nabouw:

	Aantal jaren dat het ras in het verkeer was per 30/4	Voor de 1e 500 ton per 100 kg.	Voor de 2e 500 ton per 100 kg.	Voor de volgende 1000 ton p.100 kg.	Voor de verdere hoeveelh. p.100 kg.
I.	1 - 15 jaar	f 2.50	f 1.50	f 0.75	f 0.50
II.	16 - 25 jaar	" 1.25	" 0.75	" 0.50	" 0.25
III.	26 jaar en langer	" 0.75	" 0.50	" 0.50	" 0.25

b. de vergoeding of beloning over de hoeveelheid, uitsluitend op monster en op partij goedgekeurde nabouw (handelszaad) wordt berekend volgens het schema, doch uitgekeerd naar verhouding van de goedgekeurde nabouw van het ras.

6. VOEDERLUPINE.

De kwekersvergoeding of -beloning bedraagt per 100 kg. uiteindelijk goedgekeurde nabouw:

	Aantal jaren dat het ras in het verkeer was per 30/4	Voor de 1e 1000ton per 100 kg.	Voor de 2e 1000 ton per 100 kg.	Voor de volgende 2000 ton p.100 kg.	Voor de verdere hoeveelh. p.100 kg.
I.	1 - 15 jaar	f 1.25	f 0.75	f 0.50	f 0.25
II.	16 - 25 jaar	" 0.75	" 0.50	" 0.50	" 0.25
III.	26 jaar en langer	" 0.50	" 0.50	" 0.50	" 0.25

7. UITKERING OVER ALLEEN OP PARTIJ GOEDGEKEURD VOORTKWEKINGSMATERIAAL.

Uitkering van kwekersvergoeding of -beloning over alleen op partij goedgekeurd voortkwekingsmateriaal heeft - behoudens in het geval onder 5 II onder b - slechts plaats, voorzover naar het oordeel van de keuringsinstelling de rasechtheid daarvan voldoende vaststaat.

8. MINIMUMVERGOEDING.

De krachtens het hierboven bepaalde te genieten kwekersvergoeding of -beloning bedraagt voor een hetzij op de rassenlijst, hetzij onder de aanduiding U op de bijlage tot die lijst geplaatst ras, behorende tot de onder de nummers 1, 2 of 3 genoemde cultuurgewassen, dat vijf jaar of minder in het verkeer is, ten minste f 500.-.

In bijzondere gevallen, ter beoordeling van het dagelijks bestuur van de N.A.K. kan de minimumvergoeding verleend worden voor een in de 1e alinea bedoeld ras, dat langer dan 5 jaar in het verkeer is, zolang de kweker deze minimumvergoeding of beloning nog geen vijfmaal genoten heeft.

Bij een knopmutant bedraagt dit minimum echter f 125.-.

9. O-RASSEN.

De rassen, behorende tot een der onder de nummers 1, 2 of 3 genoemde cultuurgewassen, die onder de aanduiding O zijn geplaatst op de rassenlijst, worden voor de berekening van de krachtens de hierboven bepaalde te genieten kwekersvergoeding of -beloning geacht te

vallen onder de rubriek 26 jaar en langer in het verkeer zijnde rassen (bij gewassen, behorende onder 2 sub b, onder de rubriek 16 jaar en langer in het verkeer zijnde rassen).

10. BEREKENING VAN HET AANTAL JAREN IN HET VERKEER.

Voor de toepassing van dit tarief wordt een ras geacht één jaar in het verkeer te zijn op 30 April van het jaar, volgende op:

a. voor in Nederland gekweekte rassen: het jaar, hetwelk in de 24ste of bijlage tot die rassenlijst als jaar, waarin het ras voor het eerst in het verkeer is gebracht, is vermeld;

b. voor niet in Nederland gekweekte rassen: het jaar, als zodanig bekend volgens officiële buitenlandse gegevens, bij gebreke daarvan, het door de Rijkscommissie voor de samenstelling van de rassenlijst voor landbouwgewassen als zodanig aan te wijzen jaar.

M.S. Swaminathan

51-50-300

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Agricultural Research : Prof.Dr.Ir.J.C.Dorst, Dr.H.de Haan, Ir.G.Veenstra.

Cytology: Dr.G.Bremer.

Plant Physiology: Mrs.Dr.D.E.Bremer-Reinders, Ir.L.Voskuyl.

Rye and Maize Breeding Research: Dr.F.P.Ferwerda.

Wheat, Barley and Oats Breeding Research: Ir.G.Dantuma.

Disease Resistance in Potatoes: Dr.H.J.Toxopeus, Ir.G.A.Thijn, Ir. H.T.Wiersema.

Fodder - beet Breeding Research : Ir.D.Kloen.

Lupin Breeding Research : Ir.H.Lamberts.

Grass and Clover Breeding Research : Dr.F.Wit.

Library: H.Jansen, L.A.van Melle M.S.

6. Demonstration.

All round the building are trial fields, while inside the building a show has been arranged to illustrate the plantbreeding research of the staff.

ROYAL NETHERLANDS EMBASSY

No.

MOST IMPORTANT MUSEA IN THE NETHERLANDS

Rijksmuseum - Address Director: Jonkheer D.C.Roell
Stadhouderskade 42
Amsterdam

Subdivided into:

a. Museum of paintings. - Netherlands paintings fom XVth century onwards - European painters' schools (Flemish, Spanish and French masters).
b. Museum for Arts and Crafts. - Netherlands sculpture from 1200-1900.- Ancient French and Italian plasties. - Ceramics (Asiatic, Italian, etc.)
c. Museum for History. - Documents from 1400 onwards.
d. Picture Cabinet. - Ancient pictures and drawings.
e. Library on arts and history.

x x x

Mauritshuis - Address Director: Dr. A.B. de Vries
Plein 29
The Hague

Netherlands, Flemish, Italian, German, French and English paintings and sculpture.

x x x

commemorative
Royal Cabinet of coins, medals and cut stones -

Address: Director: J. van Kuyk
Laan van Meerdervoort 7a
The Hague

Ancient coins, commemorative medals, cameo's, Babylonical and Syrian sealing-cylinders

x x x

Museum At Leiden - Address Director: Dr. W.D. van Wijngaarden
Rapenburg 23
Leiden

Praehistorical relics, excavations from Egypt, Mesopotamia, Cypres and Etruria.

x x x

Ethnological Museum. - Address Director: dr. G.W.Locher
Steenstraat 1a
Leiden

Ethnological collections from Indonesia, Southsea islands, Australia, China, Japan, Korea, India, Burma, Tibet, Persia, Arabia, Turkey,

M.S. Swaminathan 55-50-250

Showroom at the Institute of Plant Breeding at Wageningen during the months of June and July 1950.

The symbol of the Agricultural University ,the sower,is placed at the entry.The inscription " Wageningen" at the foot of the statue purposes to indicate that all institutes founded round the Agricultural University rally willingly under this banner and feel themselves one with the original agricultural center.
A synoptical table with the coat of arms of Wageningen shows that in 1873 a Municipal Agricultural School was founded.In 1876 it was replaced by a Government Agricultural School which developed into the present Agricultural University.

The guide "Wageningen ,Centre of Agricultural Science,1950, has been edited by the Institute of Plant Breeding .Just as the showroom intends to give in a short time a survey of the breeding work of the Institute of Plant Breeding and the Foundation for Plant Breeding so the guide is meant to orientate the visitors from abroad about all agricultural institutes at Wageningen. The members of the staffs of the laboratories and institutes are all listed in this booklet.

A large genealogical tree of the Institute of Plant Breeding demonstrates that several independent institutions originated from it, the history of which is indissolubly linked to that of the Institute.At a glance one can see in what year the offspring of the I.P.B. left the parental home.The branching out of these parts gave the I.P.B. an opportunity to develop.The independent institutions had their own revenue and were no longer chargeable to the budget of the Agricultural University.
The I.P.B. (1912-1950) is indicated in green,as well as every section that is still established at the parental home.From the moment that the children become independent they are represented in yellow. Thus , for instance , we see that in 1924 the List of Varieties started as a branch to become in 1942 the Institute for Research on Varieties of Field Crops .Thanks to considerable revenues it became possible from that time to bring the varietal research to a higher level.The genealogical tree shows that in 1948 the Foundation for Plant Breeding was established which made it possible to pay closer attention to the actual breeding work and the guidance of the private breeders.This is apparent from the new hot-house which,through medium of the Foundation, was built om the premises of the Institute and from the experimental farm which thanks to a considerable subsidy from the trade has been put into use by the F.P.B.
The youngest branch of the genealogical tree is the exposition " Seed Production and Seed Trade " organized by the Central Organ in the café "De Tien Zilverlingen" ,Markt 2 ,Wageningen. This exposition will convince the visitor that the Netherlands possess valuable varieties of field crops and that great care is devoted to the production of propagating material.

Ir L.Voskuyl shows the relation between the index of refraction and the dry-matter content of the beets,while plaster-casts represent the most important types of fodder beets.Formerly the determination of the dry-matter content was done by drying in an oven; now it is possible to simplify the method by means of the exhibited sounds. The Institute for Research on Varieties of Field Crops even possesses a mobile field laboratory for testing the plants of the trial fields in various parts of the country. The sounds are used to obtain sap samples of the crop in the field.

Ir D.Kloen studies among other things the jarovization of beets and turnips in order to determine how far it is possible to obtain after cold treatment seed during the first year.
The problem is graphically illustrated.The successive months are represented as bars on a rule,On one side of the line we see the normal sowing of turnips in August ,the development of foliage and root in the fall ,the dying of of the leaves in the winter and the formation of seedstalks next spring; on the other side of the line is depicted the sowing off treated seed (1° C during 10 to 30 days) at the end of February ,begin March ,root formation and flower production in spring.

Dr H.J.Toxopeus illustrates the disease and pest-resistance research in potatoes.Seedlings of the common potato (Solanum tuberosum) are stripped by the larvae of the Colorado beetle, while this is not the case with seedlings of certain Solanum demissum lines.It is worth trying to approach the question of the Colorado beetle control also from the angle of the plant breeder.
In the field of blight resistance hybrid material snows promise .The back-cross scheme is as follows:

Sol.dem. x Sol. tub.
resistant susceptible
D T

D T 100 % resistant plants
best plants x Sol. tub.

D T T 60 to 80 % resistant plants
best resistant plants x Sol.tub.

D T T T about 50 % resistant plants
best resistant plants = Sol.tub.

Further selection done by private breeders, 40 to 75 % resistant plants ,depending on the D T T T parents used.

A photo shows the difference between Solanum demissum and the common potato,while the effect of spraying the seedlings with a solution containing Phytophthora spores is also shown.

Ir H.T.Wiersema tries to stimulate the production of berries in those varieties which normally do not produce true seed .The principle is to provoke the accumulation of reserve material in the aerial part by preventing tuber formation .A drawing of a flowering potato stalk on a tomato stock illustrates one method.
There is also a photo showing the " milking" of potatoes;the young tubers are taken away and thus flower setting is stimulated. This procedure allows valuable varieties ,that usually fail to produce berries,to be crossed with those that have other interesting characters.

The student B.C.Bos demonstrates his studies on bud variations in the potato.The mutants gave indications of consisting of genetically different layers.To ascertain this the tubers were cut longitudinally.One half was planted untreated ,while the other half had all its eyes removed.The untreated part again produced the mutant type ,whereas the part without eyes developed adventitious buds from the inner layers of the tuber.This gave rise to plants corresponding to the original type from which the bud sport arose.To all probability the mutated individuals were periclinal chimeras ,the outside layer differing genetically from the inner tissues which have kept the priginal constitution.One can compare this with the combination hand and glove ,both elements differing in nature.

Ir H.Lamberts studies the improvement of lupin.The past (bitter),the present (sweet lupin) and the future (lupin with only traces of alkaloid and fit for human consumption) are indicated.

As in lupin about 20 % cross fertilization occurs the flowers have to be protected.The young inflorescences are covered by glassine bags.The photo shows an experimental field in 1949 when 5000 coverings were performed.

The plants are tested in the field on their alkaloid content. From each plant a leaf is taken in such a way that a part of the epidermis of the stem adheres to the petiole.The lower part of petiole is stuck in a solution of iodine potassium iodide.During winter the individual plants are tested by taking 5 seeds of each plant ,boiling them and adding a few drops of iodine potassium iodide.The color gives an idea of the alkaloid content of the seeds.

The lupin research embraces a great number of species and types of various origin. This is indicated on a map.

Other objects which Ir Lamberts is investigating are ,among other things, serradella and gold -of -pleasure.The latter species displays remarkable differences in oil content of the seed. Selection may produce good results.

Dr G.Bremer and Mrs D.E.Bremer-Reinders have developed a new kind of rye by means of colchicine treatment.The colchicine experiments are conducted by Mrs Bremer ,the research on the chromosomes pertains to the field of Dr G.Bremer.

The photo indicates that the treatment produces abnormal seedlings .Cell division is arrested so that the split chromosomes remain united in one nucleus and cells are formed with a double number of chromosomes (28 instead of 14 in the case of rye).The seedling will consist in a mosaic of normal (diploid) cells and cells with a double number of chromosomes (tetraploid). The offspring of such mixoploid plants are examined individually by Dr Bremer and the tetraploid plants are kept for further breeding .These plants will produce tetraploid progeny if they fertilize each other.

There are also exhibited samples of tetraploid buckwheat,canary grass and flax.

Ir G.Dantuma directs the attention to the fact that it is possible to obtain an idea of the cold resistance of wheat varieties and selections by means of spring sowing.

The photo clearly shows that winter-hardy varieties when sown in spring don't produce ears ,while moderately resistant types shoot but ripen too late to produce seed.The spring types ,of course ,when sown in spring develop ears and ripen their grain. In this way it is possible to test new selections on cold resistance and to compare the results with those of freezing-chamber and frost periods.

Dr F.P.Ferwerda demonstrates inbred lines of rye .Artificial self fertilization starting from normal rye plants gives after a few generations a progeny entirely consisting of dwarfs. Intercrossing between various inbred lines ,however, restores the vitality and even produces cases of hybrid vigor or heterosis, which has acquired such importance in maize breeding.

Inbred lines and hybrids of maize show the marked effect of heterosis ,In producing hybrid seed 4 inbred lines are used.In sowing e.g. alternatively 3 rows of line A and one row of line B and by early removal of the (male) tassel of A they will be fertilized by pollen of B (which also fertilizes itself) .Thus hybrid seed is obtained om A plants ,but owing to the reduced vigor of these plants they have only small ears and produce few kernels.The seed would be too expensive for commercial production.However ,by making simultaneously hybrid seed C x D and by crossing next year A B x C D it is possible to get hybrid seed on vigorous plants.This deed is commercialized as double-

cross seed.Maize growing in the United States is based for about 90 % on such double-cross seed ,the ordinary varieties having been pushed into the back-ground .The breeder has to build inbred lines, determine the good combinations by means of test crosses and maintain the good inbred lines.The farmers buy each year new hybrid seed .

Further is shown material of wheat x rye hybrids.

Dr F.Wit gives an outline of the improvement of English ryegrass .Starting from single plants clones are developed.The clones are tested in the field and freezing-chamber for cold resistance.The winter hardy clones that also make a good impression in other respect are planted in bulk on trial cross plots.The progeny is again tested for cold resistance and other characteristics .The best clones are then selected and increased. Photos illustrate the procedure.

Mr J.Dros graphically depicts the data gained from a trial field with spring wheat with 3 sowing periods and 3 levels of nitrogen manuring.

Dr H.de Haan schematically represents the development of a new wheat variety. A cross is made and the resulting hybrid population ,when promising ,is kept by the Institute.After about 7 years of bulking ears or plants are chosen for line selection. At the same time samples of 100 grams of the hybrid population are placed at the disposal of private breeders.

A schematic representation of a flax trial field gives an idea how the student J.Boshouwers has tried by means of selection on rust and firing resistance to " narrow" hybrid populations .

Another sketch shows how the varieties of the Institute are maintained .Third year lines resulting from selections in foundation plots are combined to be increased to foundation stock of the breeder.

This method is illustrated with the help of a genealogical tree of Imperiaal II a wheat.

Finally we call the attention to the interesting collection sent in by the Netherlands Flax Institute .On the wall are shown flax samples accompanied by corresponding fiber samples of different varieties grown under varying nitrogen dosages .Besides there is a map of the Netherlands on which the locations of the retting and scutching establishments are marked.

The processing of flax is also rendered in miniature;from mechanical pulling and rippling to spinning and weaving.There are also samples of thread and linen ,oil and paint ,soap, printing-ink ,oil-cake and linoleum.

A histogram of wooden columns gives a graphical representation of the flax area of the Netherlands and the export of seed, flax straw ,fibre and tow during the course of the years.

A statistical survey of the export of flax products shows that in 1949 for a value of 40 million guilders was shipped to various countries.This demonstrates how important it is for the Netherlands ,country with a debit trade balance,to promote flax growing.