

# THE CHOICE OF LUCERNE VARIETIES IN THE NETHERLANDS

W. SCHEIJGROND, H. VOS and H. ZIKKEN  
Institute for Research on Varieties of Field Crops

## INTRODUCTION

The area cultivated with lucerne in the Netherlands has been considerably extended since the war. Especially on soils which had been inundated with salt water and could once more be put under cultivation after the dykes had been repaired, and on the arable land of the newly reclaimed Zuyder Zee polder, the North-East polder, much lucerne was grown.

According to data from the Central Bureau for Statistics the lucerne area in the Netherlands was  $\pm$  3300 ha in 1939, 39% of which was in Zeeland, and 33% in Noord-Holland (Wieringermeer).

In 1952 this was  $\pm$  10.000 ha, about 38% of which was in the North-East polder, 26% in Zeeland, 9.5% in Zuid-Holland, 9% in Noord-Holland, 7% in Noord-Brabant, 4.5% in Groningen, 3% in Limburg, 2% in Gelderland, 0.6% in Utrecht and 0.2% in Friesland.

Artificial drying, that is considerably extended owing to the difficulties connected with the concentrates supply during the first post-war years and that made it possible to make lucerne growing pay in areas with poor live-stock, in its turn stimulated the extension of this cultivation in different areas.

Until now the cultivation was mainly restricted to the clay and sandy clay soils, but it also seems possible on sandy soils in good cultural condition.

Lucerne is perennial and here, as a rule, it is left for two, three or four years. It is very productive, rich in proteins, and very drought-resistant.

The very favourable influence lucerne has on the structure of the soil is generally known.

## THE CURRENT VARIETIES

Until very recently in the Netherlands mainly *Provencer lucerne* was grown. Side by side with it there was also some cultivation from another origin, i.e. *Hungarian* and *Grimm lucerne*. After 1947 the Northern French varieties attracted special attention. Among these in the country of origin are distinguished the variety *Lucerne du Puits*, which has been included in the Netherlands Descriptive List of Varieties of Field Crops, and the indigenous variety, a number of types of which have been registered. Of these types the List of Field Crops mentions: *Lucerne Flamande Chartainvilliers*, *Lucerne Flamande Flan-dria*, and *Lucerne Flamande Socheville*.

Side by side with the Northern French lucernes *Provencer* is still being grown and on a small scale also *Altfränkisch*, *Italian*, and *Grimm lucerne*. In Limburg there occurs an indigenous variety, the cultivation of which has remained very limited owing to the absence of any considerable seed-growing.

## SOWING

Lucerne is usually sown in spring in rows under a cover crop. According to experimental field data, the Northern French lucernes agree in general better with a cover crop than the other varieties. In order to avoid a too



PHOTO 1. DIFFERENCES IN DEVELOPMENT BETWEEN 2 VARIETIES OF LUCERNE ; ON THE LEFT A HYBRID-LUCERNE, AT THE RIGHT A VARIETY OF THE NORTH-FRENCH GROUP.

heavy cover crop, sowing in spring is also done without the cover crop. In the Southern part of the Netherlands sowing in this way is successful until July ; when sown later, a less favourable autumn gives a crop which faces winter when only weakly developed.

Usually there is no cutting in early autumn when sowing is done under a cover crop ; in case of sowing in due time without cover crop, as a rule, two cuts can be made in the same year. In the following years as a rule three, sometimes four cuts are made per season. In the Netherlands grazing on lucerne has found practically no acceptance. It is not considered here, nor is the use of mixtures of lucerne and grasses.

#### THREE OR FOUR CUTS

In general four cuts do increase the yield in the year concerned, but this usually causes a set-back in the following year. In a number of interprovincial experiment fields the differences in yield between *Lucerne du Puits* and *Provencier* were practically not affected by three or four cuts. In an experiment field with a considerable range of varieties the impression was that the late-flowering lucernes decreased more in yield after four cuts than did the early-flowering varieties.

#### THE RELATION BETWEEN THE CUTS

When sown in spring without cover crop the yield ratio between the two cuts made that year is about 1 : 1. In the following years, when treated normally (three cuts), the first cut gives the greater portion in the total annual yield with or without a cover crop ; usually 40 to upwards of 50%. This portion

is larger with hybrid-lucerne (*Medicago media*), such as *Grimm* and *Altfränkisch*, than with the varieties which can be taken as belonging to the ordinary lucerne (*Medicago sativa*), such as the *Northern French lucernes* and the *Provencer*. This does not mean that the yield of the first cut of hybrid-lucerne is higher than that of the ordinary lucerne.

In the experiment fields the first cut of hybrid-lucerne, for instance, always proved to be smaller than that of the lucernes of the Northern French group. The second cut amounts to about 30–35% of the annual yield and the third one is  $\pm$  20–25%. With the hybrid-lucerne the third cut is relatively smaller. Naturally the yield ratios between the cuts are much dependent on the cutting dates.

#### INFESTATION BY GRASSES

Especially when four cuts are made, the crop may be infested considerably by weeds. Amongst the weeds which infest the crop some species of the genus *Poa* are prominent.

This infestation by grasses can be a serious impediment when growing lucerne. It is therefore advisable to pay the necessary attention to this problem. In this respect the choice of a variety plays an important part. The *Northern French lucernes* suffer considerably less from being overgrown by grasses than many others (see table IV).

#### THE EXPERIMENT FIELD RESULTS

In the spring of 1949 some *Northern French lucernes* and also *Provencer* and *Italian* crops were sown on two experiment fields, one at Hemmen in the Betuwe, the other in the North-East polder, without cover crop.

In tabel I the yields of green matter, obtained in the consecutive years, are mentioned in their ratios.

Table 1. Yield of green matter in ratio figures in Hemmen and in the N.E.-Polder.

Variety	1949		1950		1951		Average 1949, 1950 and 1951		
	Hemmen	N.E.P.	Hemmen	N.E.P.	Hemmen	N.E.P.	Hemmen	N.E.P.	Hemmen and N.E.P.
Du Puits .....	110	110	108	108	110	111	109	110	110
Flamande Chartainvilliers .	105	108	105	102	106	110	105	107	106
Flamande Flandria .....	102	97	104	100	115	108	107	102	105
Provencer .....	91	93	94	103	92	95	92	97	95
Italian .....	93	92	89	87	78	75	87	85	86
100 =	23200	29000	67100	77800	59000	79700	kg/ha		

The material from the experiment field at Hemmen has also been tested on the contents of dry matter and of crude protein. The results of these tests are given in the tables II and III.

Table II. Percentage of dry matter and crude protein (Hemmen).

Variety	Dry matter content in %				Crude protein content in % (in dry matter)			
	1949	1950	1951	Average '49, '50 and '51	1949	1950	1951	Average '49, '50 and '51
Du Puits .....	21.9	19.2	18.3	19.3	17.1	18.7	17.9	18.1
Flamande Chartainvilliers .	21.8	19.1	18.4	19.3	17.5	18.8	18.1	18.3
Flamande Flandria .....	21.6	19.3	18.4	19.2	17.6	19.2	18.3	18.6
Provencer .....	22.3	19.0	18.3	19.2	17.4	20.1	19.0	19.2
Italian .....	22.7	18.8	18.4	19.3	16.9	20.1	19.5	19.3

Table III. Yield of dry matter and crude protein (Hemmen).

Variety	Yield of dry matter in ratio figures				Yield of crude protein in ratio figures			
	1949	1950	1951	Average '49, '50 and '51	1949	1950	1951	Average '49, '50 and '51
Du Puits .....	109	108	109	109	108	105	100	106
Flamande Chartainvilliers .	104	105	106	105	105	102	104	103
Flamande Flandria .....	100	105	115	108	101	105	114	108
Provencer .....	92	94	91	92	92	97	94	95
Italian .....	96	88	78	86	93	91	82	88
100 =	5100	12800	10800	kg/ha	880	2480	2000	kg/ha

In these tables the yields are not specified "per cut", because the distribution of the yield over the cuts did not show great differences in the varieties mentioned. In 1949 two cuts were made, in other years three.

From the figures thus obtained, the following remarks can be made regarding the content and yield of dry matter and protein.

The dry matter content of the varieties is practically equal. There are differences in the protein contents. These are also due to the fact that on the dates of cutting the varieties were in unequal stages of development according to their being early or late.

The Northern French lucernes give a considerably higher yield of dry matter as well as of protein, as compared to *Provencer* and especially to *Italian lucerne*, in spite of a protein content which is often somewhat lower.

The Northern French lucernes do not differ considerably between themselves.

In view of the increasing importance of lucerne cultivation in the Netherlands it seemed desirable to explore the possibility of increasing the choice of varieties by testing a great number of types of various origins. To this effect seed samples were applied for in several countries through the intermediary of the Government Commissioner's Bureau for Foreign Agrarian Affairs. The assort-

ment thus obtained was sown in an experiment field of river clay at Hemmen in comparison with the lucerne varieties already mentioned.

Side by side with these, those varieties of lucerne, of which there was sufficient seed were tested on the experiment fields of the Experiment Farm at Marknesse (N.E.P.) and at Mr J. KAPENGA's, ZIJLDIJK, by Ir W. A. BOSMA, Head of the Section Experiment Fields of the Dir. of the Wieringermeer, Division N.E.Polderworks, and by Ir P. G. MEIJERS, Government agricultural advisory officer for N. Groningen. The results of this research are also discussed in this treatise.

Meanwhile also O.E.E.C. felt the need of making international tests with a number of varieties of lucerne from various origins for the improvement of fodder cultivation in Western Europe.

Through the intermediary of Dr Ir H. J. FRANKEMA the Institute for Research on Varieties of Field Crops was interested in these experiments and this Institute received seeds of a number of varieties from Dr R. MAYER, Director of the Institut National de la Recherche Agronomique.

The provisional results of the experiments with these lucernes are also taken into consideration in the following survey.

The assortment is here grouped according to origin. For the yield average ratio figures are estimated based on the results of weighings and observations.

Finally a short description is given of the groups of varieties and origins mentioned in table IV.

Table IV. Comparative survey of various varieties and origins of lucerne.

The figures in the columns 1, 2, 3, 4 and 5 are estimated averages, obtained by means of determination of the yield and/or observations. High figures mean high yield, quick regrowth, early flowering, little infestation by grasses, and good winterresistance respectively. The figures apply to Netherlands circumstances	1	2	3	4	5
	Yield in comparative figures	Speed of regrowth after winter	Earliness of flowering	Infestation by grasses	Winter-resistance
<b>WESTERN EUROPE</b>					
<i>Northern France</i>					
Du Puits .....	108	8	9	8	7
Flamande Flandria .....	105	8	9	8	7
Flamande Chartainvilliers .....	105	8	9	8	7
Flamande Socheville .....	105	8	8	8	7
Flamande C 49 .....	105	8	8	8	7
<i>Central France</i>					
Poitou .....	95	6	6.5	6.5	6
Marais .....	95	6	6.5	6.5	6
<i>Belgium and Luxemburg</i>					
Belgian indigenous variety .....	100	7	8	7	7
Luxemburg .....	90	5.5	6.5	5.5	7
<b>CENTRAL EUROPE</b>					
<i>Austria</i>					
Burcker Pannonian .....	100	6.5	7	7.5	8
Austrian (via Portugal) .....	85	6.5	5.5	7	8

The figures in the columns 1, 2, 3, 4 and 5 are estimated averages, obtained by means of determination of the yield and/or observations. High figures mean high yield, quick regrowth, early flowering, little infestation by grasses, and good winterresistance respectively. The figures apply to Netherlands circumstances	1	2	3	4	5
	Yield in comparative figures	Speed of regrowth after winter	Earliness of flowering	Infestation by grasses	Winter-resistance
<i>Germany</i>					
Schillings .....	95	5.5	7	7	8
Altfränkisch .....	95	5.5	6.5	7	8
Rheinisch .....	90	5.5	6.5	5	8
Altthüringer .....	85	5	6.5	5	8
<i>EASTERN EUROPE</i>					
<i>Czechoslovakia</i>					
Prerovska Moravia .....	100	6.5	7	7	8
Ceska Krajavo .....	100	6.5	7.5	6.5	8
Kasticka III .....	100	6	7	6	8
Brneska Viola .....	95	7	7	6.5	8
Hodoninska .....	95	7	6.5	6	8
Moravska Krajavo .....	95	6.5	7	6	8
<i>Hungary</i>					
Mezoheques .....	100	6	7	6	8
Hungarian .....	95	6	7.5	5	8
Agrimex U 101 .....	90	6	4	5	8
<i>Rumania</i>					
Rumanian (Transylvania) .....	95	6.5	6.5	5	7
<i>Bulgaria</i>					
Bulgarian .....	85	6	6.5	4	7
<i>NORTHERN EUROPE</i>					
<i>Denmark</i>					
Ötofte E 730 .....	100	5	6	6	8
<i>Sweden</i>					
Swedish .....	95	4.5	6.5	6	8
<i>SOUTHERN EUROPE</i>					
<i>Southern France</i>					
Provencer .....	90	7	7.5	6.5	5
<i>Italy</i>					
Friulian .....	95	7	8	6	5
Lazio .....	90	7	6.5	5.5	4
Marche .....	90	6	6.5	4.5	4
Italian .....	85	7	6.5	6	4
Emilia .....	85	6.5	7	6	4
Lodi .....	80	6.5	6.5	5.5	4
Romagna .....	80	6	6.5	4	4
<i>Greece</i>					
Grecian .....	70	6	6	6	3
<i>Spain</i>					
Aragon .....	70	5	5.5	5	4
Murcia (via Argentine) .....	65	3	4.5	4	3
Murcia .....	45	2	4.5	2.5	2

The figures in the columns 1, 2, 3, 4 and 5 are estimated averages, obtained by means of determination of the yield and/or observations. High figures mean high yield, quick regrowth, early flowering, little infestation by grasses, and good winterresistance respectively. The figures apply to Netherlands circumstances	1	2	3	4	5
	Yield in comparative figures	Speed of regrowth after winter	Earliness of flowering	Infestation by grasses	Winter-resistance
<b>NORTH AMERICA</b>					
<i>United States</i>					
Grimm .....	92	3	5.5	6	8
Williamsburg .....	90	5.5	5.5	6.5	7
Narragansett .....	90	5	6	5.5	7
Atlantic .....	90	6.5	5.5	4	7
Ranger .....	85	5	5	5.5	7
Cossack .....	85	4	5.5	5	8
Kansas Common .....	85	4.5	5	5.5	7
Buffalo .....	80	6	5	4.5	7
<i>Canada</i>					
Ontario Variegated .....	90	4.5	5.5	5	9
Rhizoma .....	90	4	5	5	9
Canauto .....	85	3.5	5.5	4	9
Ladak .....	85	3	5.5	3.5	9
Ferax .....	85	2.5	5.5	5	9
Viking .....	80	2.5	5.5	4	9
<b>SOUTH &amp; CENTRAL AMERICA</b>					
<i>Argentine</i>					
Argentinian (Guatrache) .....	90	6	4	7	4
Argentinian (Tornquest) .....	90	6	4.5	6	4
Lucerne from Cordoba .....	80	6	4	5	4
Lucerne from Lincoln .....	75	6	4	7	4
Lucerne from Casbas .....	70	5	4.5	6	4
Argentinian (Secano) .....	60	4	4	5	3
Argentinian (Blas Picardi) .....	50	5	4	5	3
<i>Mexico</i>					
Lucerne from Hidalgo .....	80	5	4	7	4
<i>Brazil</i>					
Lucerne from Goyana .....	70	5	4	6	4
<i>Peru</i>					
Peruvian .....	60	2	5	5	3
<i>Chile</i>					
Chilean .....	30	2	4.5	2	2
<b>SUNDRIES</b>					
<i>New Zealand</i>					
Improved selection from Marlborough	90	5.5	6.5	6	5
<i>India</i>					
Lucerne from Sialkot .....	80	6	5.5	4	3
Lucerne from Amritser .....	70	5	5.5	4	3
<i>South Africa</i>					
South African .....	55	2	4.5	5	2



PHOTO 2. THE NORTHERN FRENCH LUCERNES (AT THE RIGHT) GIVE THE HIGHEST YIELD IN DRY MATTER AND CRUDE PROTEIN ; THEY HAVE THICKER STALKS THAN THE OTHER VARIETIES.

Short description of the varieties mentioned in table IV and of their origin.

#### WESTERN EUROPE

Under this heading are grouped the Northern French lucernes that are important to the Netherlands, and those from Central France, Belgium and Luxemburg.

The *Northern French lucernes* give the highest yield in dry matter and crude protein ; they have rather thick stalks.

Owing to their rapid regrowth and strong development, the infestation by grasses is less than with the following varieties. The representatives of the Northern French type are the earliest flowering ones ; in general they respond to four cuts better than the other lucernes. They are satisfactorily winter-resistant.

There are no considerable differences between *Lucerne du Puits*, *Lucerne Flamande Chartainvilliers*, *Lucerne Flamande Flandria* and *Lucerne Flamande Socheville*.

*Poitou* and *Marais* from Central France give lower yields, are less winter-resistant but they have not such coarse stalks as the Northern French varieties.

An *indigenous variety from Belgium* bore much similarity to the Northern French lucerne but the yield was lower. *Lucerne from Luxemburg* gave a moderate yield.



## CENTRAL EUROPE

Amongst these are classed the Austrian and German lucernes which are in general winter-resistant.

Of the Austrian lucerne *Burcker Pannonian* has given satisfaction. Nondescript *Austrian commercial seed*, received via Portugal, yielded much less.

In South and Central Germany many indigenous varieties and varieties of hybrid lucerne occur. Of these the indigenous variety *Altfränkisch* may be mentioned. It is a winter-resistant lucerne with slender stalks but as to yield it remains below the Northern French lucernes. Its growth in spring and regrowth after a cut are rather slow.

A recognised indigenous variety, collected under the supervision of an official German selection institute, is sold under the name *Altfränkische lucerne Frankenwarte*.

*Schillings* also belongs to this type.

*Rheinische* and *Altthüringer* have given less satisfaction.

## EASTERN EUROPE

The Eastern European lucernes, amongst which are grouped those originating in Czechoslovakia, Hungary, Rumania and Bulgaria are in general fairly to well winter-resistant.

The *Czechoslovakian lucernes* are leafy and they have not such coarse stalks as those from Northern France; they are somewhat less productive but still give a good yield. As appears from the table, there exist differences in yield between them.

*Hungarian lucerne* has been relatively satisfactory. Of these especially *Mezoheques* is practically similar to the good Czechoslovakian lucernes. *Agrim-pex U 101* makes a moderate impression.

The *Rumanian types* have been fairly satisfactory, the *Bulgarian varieties* inadequately.

## NORTHERN EUROPE

The Northern European lucernes (*Danish* and *Swedish*) are well winter-resistant but in the beginning they develop somewhat slowly.

The Danish variety *Ötofte E 730* has given a good yield.

## SOUTHERN EUROPE

To this group belong the lucernes from Southern France, Italy, Greece and Spain.

They have low winter-resistance and yield much less than the Northern French lucernes.

The lucerne from Southern France is sold under the name *Provencer*. The imports of *Provencer* may vary noticeably in yield as well as in other characteristics. Of the Italian lucernes, *Friulanian* has been the most satisfactory. Most other Italian lucernes however yield a little less than *Provencer*. For the rest in many characteristics they are similar to the last-mentioned variety.

*Grecian* and *Spanish lucerne* have made a bad impression.

In general the development of the Southern types is considerably influenced by warm summer weather.

## NORTHERN AMERICA

The lucernes from the United States develop rather slowly. The yields are moderate to very moderate. They are well winter-resistant.

*Grimm*, *Williamsburg*, *Narragansett* and *Atlantic* gave a slightly better yield than *Ranger*, *Kansas Common*, *Cossack* and *Buffalo*.

Of all these lucernes seed was bought in the U.S.A. ; in addition small seed samples of *Ranger*, *Kansas Common* and *Buffalo* were received from the Argentine. These gave a better development, coarser stalks and they were leafier than the same varieties from the U.S.A. We suppose that these differences are the result of the varieties having been multiplied in the warmer climate of the Argentine.

On an average the *Canadian* types develop even slower than those from the U.S.A., their yield being for the rest about equal. Canadian lucernes have short and slender stalks and they are moderately leafy. The growth is, as with all hybrid lucernes, less erect than that of the Northern French lucernes. They are very winter-resistant. These lucernes suffer much from the infestation by grasses. *Rhizoma* and *Ontario variegated* have made the best impression.

## SOUTHERN AND CENTRAL AMERICA

The types under this heading are in general not sufficiently winter-resistant.

The Argentine types from *Tornquest* and *Guatrache* gave moderate yields. The other *Argentine origins* as well as those from *Mexico*, *Brazil* and *Peru* were not very satisfactory, *Chilean* lucerne gave a very poor crop.

## SUNDRIES

Here the lucernes from New Zealand, India and South Africa have been summarised.

The *New Zealand selection from Marlborough* gave a moderate yield. The lucernes from *India* were less prolific, the *South African* lucerne gave a poor crop.

## CONCLUSION

On account of the experiments mentioned the previously mentioned lucernes may be classified as follows as to their usefulness in the Netherlands. In this classification the varieties and types are ranged — also in groups — according to their order of recommendation value.

Received under the name	Country of origin	Received under the name	Country of origin
<i>Very good</i>		<i>Very moderate</i>	
Du Puits .....	Northern France	Austrian (via Portugal) ..	Austria
Flamande Flandria ....	"	Althüringer .....	Germany
Flamande Chartainvilliers .....	"	Bulgarian .....	Bulgaria
Flamande Socheville ....	"	Canauto .....	Canada
Flamande C 49 .....	"	Ladak .....	"
		Ferax .....	"
<i>Good and fairly good</i>		Ranger .....	U.S.A.
Ötofte E 730 .....	Denmark	Cossack .....	"
Prerovska Moravia ....	Czechoslovakia	Kansas Common .....	"
Ceska Krajavo .....	"	Buffalo .....	"
Kasticka III .....	"	Viking .....	Canada
Mezoheques .....	Hungaria	Lazio .....	Italy
Burcker Pannonian ....	Austria	Marche .....	"
Belgian indigenous variety .....	Belgium	Argentinian (Guatrache) .	Argentine
Schillings .....	Germany	Argentinian (Tornquest) .	"
Altfränkisch .....	"	Italian .....	Italy
Swedish .....	Sweden	Emilia .....	"
Brneska Viola .....	Czechoslovakia		
Hodoninska .....	"	<i>Unfit for the Netherlands</i>	
Moravska Krajavo .....	"	Lucerne from Cordoba ..	Argentine
Hungarian .....	Hungary	Lucerne from Hidalgo ..	Mexico
Rumanian .....	Rumania	Lodi .....	Italy
Poitou .....	Central France	Romagna .....	"
Marais .....	"	Lucerne from Sialkot ..	India
		Lucerne from Lincoln ..	Argentine
<i>Moderate</i>		Aragon .....	Spain
Grimm .....	U.S.A.	Lucerne from Casbas ..	Argentine
Ontario Variegated ....	Canada	Lucerne from Goyana ..	Brazil
Rhizoma .....	"	Grecian .....	Greece
Rheinish .....	Germany	Lucerne from Amritser ..	India
Agrimex U 101 .....	Hungaria	Argentinian (Secano) ...	Argentine
Luxemburg .....	Luxemburg	Peruvian .....	Peru
Williamsburg .....	U.S.A.	South African .....	South Africa
Narragansett .....	"	Argentinian (Blas Picardi)	Argentine
Atlantic .....	"	Murcia .....	Spain
Friulian .....	Italy	Chilean .....	Chile
Provencer .....	Central France		
Improved selection from Marlborough	New Zealand		

#### ACKNOWLEDGEMENTS

The experiments on lucerne described in this report have been made in close collaboration with the Committee for Research on Varieties for the benefit of the Board for Agricultural Seeds and Seed-potatoes (Bedrijfsschap voor Zaaizaad en Pootgoed). We have gratefully used the results of the inter-provincial experiment fields and the collaboration received from the Ministry of Agriculture, Fisheries and Food-supply Division of Foreign Agrarian Information, the agricultural attachés and from messrs Dr Ir H. J. FRANKENA, Ir W. A. BOSMA and Ir P. G. MEIJERS.

