WAGENINGEN AGRICULTURAL UNIVERSITY PAPERS
90-2 (1990)

LANDRACES AND IMPROVED CULTIVARS OF BREAD WHEAT AND OTHER WHEAT TYPES GROWN IN THE NETHERLANDS UP TO 1944

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ISN522291

Cip-data Koninklijke Bibliotheek, Den Haag

Zeven, A. C.

Landraces and improved cultivars of bread wheat and other wheat types grown in the Netherlands up to 1944/A. C. Zeven. – Wageningen : Agricultural University. – Ill. – (Wageningen Agricultural University papers, ISSN 0169-345 X; 90-2(1990))
With ref.
SISO 632.4 UDC 633.11(492) (091) NUGI 835
Subject heading: wheat; The Netherlands; history.

ISSN 0169-345X
ISBN 90-6754-167-2
NUGI 835

Printed in the Netherlands by Drukkerij Veenman B.V., Wageningen

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Introduction

Wheat species, types, landraces and cultivars from time immemorial up to 1944

Bread wheat (*Triticum aestivum* L.) and other wheat species have been cultivated for many millenia in the present-day Netherlands. The first introduction must have been mixtures of emmer, einkorn and some bread wheat. Later bread wheat became the dominant crop, whereas in some parts spelt was grown.

Wheat cultivars adapted to their surroundings: the environment and the crop husbandry of farmers. As a result landraces developed. Little is known about the types of landraces grown before the 17th century, except for the information obtained from archeological remains. This information is often limited to the composition of a mixture and the size and shape of the grains.

Information about later periods slowly becomes available, increasingly so with recent periods. At the end of the 18th century the first descriptions on wheat cultivars were published. Earlier a few plants were stored in herbaria. A hitherto unexplored source of information are paintings by Flemish and Dutch artists who worked in the 16th, 17th and 18th centuries. Most depicted ears are awnless.

I believe that it is worthwhile to compile all data on wheat species, types, landraces and cultivars grown in the present day Netherlands up to 1944. From 1945 much more information has been recorded due to increased interests and activities of wheat breeders and researchers

The history of wheat breeding in the Netherlands is not the subject of this publication. The history has been skillfully treated by de Haan (1957b).

Tarwe or weit

In the Netherlands two words are being used for bread wheat, viz. tarwe and weit. Each has its own dialectic forms. In general tarwe is considered as Standard Dutch. Since mediaeval times both words have a geographic distribution with for boundary the former Zuyderzee – province of Utrecht and southwards (Heeroma, 1935). West of this boundary one uses tarwe and on the east it is weit (van Veen, 1964).

The word weit is related to wheat, the German Weizen, the Scandinavian hvede, meaning the white flour derived from it, whereas greyish flour is obtained from rye.

Tarwe is an Indo-European word, related to words in Old and Modern Russian, Lithuanian, Indian and Greek languages. Maybe tarwe entered the Netherlands at an early period. The word may have been used for a mixture of einkorn and emmer, with an admixture of bread wheat. At a later period this mixture,

which did well on loess soils, changed in composition with bread wheat dominating, when it was grown on clay soils, while the name tarwe was still used for this mixture and later exclusively for bread wheat alone.

The origin of both words and the meaning of especially the limited geographic distribution of the word tarwe, needs further research.

The possible meaning of ris and rijs

Several wheat forms and cultivars carry the name part ris or rijs (ij being one vowel in Dutch and somewhat equivalent to y, pronounced as ey in Leyden). For instance, in bread wheat we find the cultivar names such as 'Gelderse Ris', 'Angelris' and 'Risweit', and for *T. dicoccum* we know vernacular names as Duitse Rijs, Gortrijst and Rijsspelt. An explanation is that ris and rijs are related to the Old Persian *brizi* and the Sanskrit *vrihi*. These words also are the source of *Oryza* and hence rice, while *vrihi* could be the source of the word rye too (Porter, 1891). In English a vernacular name for *T. dicoccum* is French rice (Porter, 1891).

Maybe ris or rijs is an old Dutch name for a long-strawed wheat, like *T. dicoccum*.

Wheat types

Archaeological remains of *Triticum* material dating from ca 4000 BC indicate that at first a mixture of emmer wheat and einkorn with an admixture of bread wheat, was grown on the loess soils of south Limburg (Clark, 1965). Wheat mixtures had reached that part of the Netherlands with the Danube farmers of the Band-Ceramic culture. At a later date bread wheat became the main crop, but the time of change is not well-known. However, it must have taken place in mediaeval times. Zeven (1980) showed that these bread wheats must have been the parental material of the later bread wheat landraces. Wheat was also grown in a mixture with rye. This mixture was named masteluin. The farmer preferred to grow wheat, but the yield stability of this crop in monoculture was low. To some extent rye protected wheat against adverse environmental conditions.

Herbals indicate which kinds of wheat were available. For example, de Lobel (1581) described Ghemeyne Terwe (common winter bread wheat), Robus, Ghebaerde terwe (Bearded wheat), Ghebaerde terwe with very 'doubled' ears (*turgidum* wheat), Tweederley terwe In Walschlandt Blé locus gheheeten (probably a transitory wheat), Somer-terwe van dry oft vijf maenden (spring bread wheat of three or five months). In addition to these wheats, spelt was described under various names in herbals. Fuchs (1543), in Germany, divided the wheats into terwe (probably common winter bread wheat), Roomsche terwe (*turgidum*) and Amelkoorn (*dicoccum*). Amel refers to *amylum*, i.e. starch. There were two spelt types, viz. spelt (*spelta*) and einkorn (*monococcum*). De Lobel called the latter St Peeterskoorn and described it as a very bad spelt.

Grouping of landraces and cultivars

Wheat cultivars can be grouped according to some of their morphological characters (short v. tall, red- v. white-chaffed, pubescent v. glabrous, red- v. white-grained), their time of sowing, i.e. vernalisation requirement (winter v. spring habit) and use (bread making, paste making, feed). However, they can also be grouped according to their level of adaptation. So ten Rodencate (1907) divided the wheat cultivars of early 20th century into three groups: 1. English Squarehead, 2. Zeeuwse, and 3. Gelderse.

This grouping is quite poor as there were many other cultivars grown at that time. However, from the evolutionary point of few we may say that 'Zeeuwse' was probably an old well-adapted landrace, 'Gelderse' was a recently introduced landrace not yet adapted to its new environment, while 'Squarehead' was probably derived from one or a few plants and had not yet reached a full landrace status.

Broekema (1933) placed the wheat cultivars in a range. At one end he classified the landraces 'Gelderse' and 'Zeeuwse' and the other end squarehead Wilhelmina type with the cultivars 'Wilhelmina', 'Vada' and 'Robusta'. For a landrace high yield stability is of more importance than high yield. Nature selects for characteristics which promote yield stability. Such characteristics are a high culm number per plant, small ears with few florets per spikelet, and small grains. Despite the capacity of the plants to become tall, plants do not grow tall owing to the poor nitrogen conditions of the arable land. Therefore, when nitrogenous fertilizer is given, the plants become very tall and lodge. Natural selection for lodging resistance resulted in plants with small, xerophytic leaves, elastic not too long straw and lax ears, which dry up quickly. Furthermore, in spite of their genotypic differences, plants of a landrace are inclined to resemble each other. Etiolation causes somewhat shorter plants to become a little taller to reach the same height as neighbouring plants. The same is true for plants which ripen a little earlier or later than their neighbours. They become a little later or earlier respectively. This was already reported in 1857 (Anon., 1857b).

The Wilhelmina type cultivars had a low hectoliter (hl) weight, large often squarehead ears with many florets per spikelet, and large often floury grains, The plants often had broad hygrophytic leaves and well-developed stiff straw.

Broekema classified the other cultivars between the above mentioned extremes as the 'compromise' cultivars. However, new cultivars suitable for harvesting with a self-binder were developed, could not be classified between Landraces and Wilhelmina type groups.

Based on Broekema's data Lienesch (1934) divided the cultivars into 1, the Landrace group, 2. the Wilhelmina group and 3. the Newest group.

To combine all landraces in one group is not satisfactory and therefore we propose the following landrace groups.

Landrace groups

Around 1840 various landraces were grown in the Netherlands. Some were grown for many years or even centuries; others were recent introductions. These latter landraces might still have been in the progress of adapting themselves to the new environments.

Landraces are often named after the region from where sowing seed originally or recently was obtained, or after the region where they were grown. This may mean that landraces, although they carry different names are in fact genetically similar or are related to each other and belong to the same group of related landraces. Such groups of landraces are named landrace groups.

In fact the use of the word landrace is confusing. So we use the landrace names 'Goese' (from Goes region) and 'Walcherse' (from the island Walcheren), but both landraces belong to the landrace 'Zeeuwse', while the landraces 'Zeeuwse' and for instance 'Witte van Vlaanderen' are related and belong to the landrace group Zeeuwse (Zeven, 1986, 1990).

Information on landraces of wheat dates mainly from the 19th and 20th century. Some information is limited to a name only, some offer more particulars. This implies that it is impossible to classify all landraces mentioned hereafter into landrace groups. It is quite possible that some of them belong to a yet unidentified landrace group, which was largely replaced by unrelated landraces introduced from the Cleve-Goch-Geldern area in West Germany in the 19th century. Maybe this unidentified landrace group includes the landraces 'Alkmaarse', 'Betuwse', 'Bovenlandse', 'Brabandse', 'Maasbommelse', 'Noord-Hollandse', 'Ouwertse', 'Over-Maasse', 'Sameltarwe', 'Schiedamse', 'Stichtse', 'Tielerwaardse' and 'Vriese'. However, it also is possible that the landraces from the river clay region belong to another yet unidentified landrace group. No conclusion can be reached for the mentioned landraces.

The morphology of the ears of 17th and 18th century landraces can be seen from paintings made in those centuries (Table 1). Several ears resemble those of 'Zeeuwse', others appear similar to the later introduced 'Gelderse'. Apparently, before 'Gelderse' was introduced wheat landraces with a similar appearance were already grown in the Netherlands.

However, other landraces can be grouped into landrace groups. We concluded that the following landrace groups existed:

- Zeeuwse landrace group
- Ruwkaf Essex landrace group
- Gelderse landrace group
- Ruige Kleefse landrace group.

To these groups we add the Squarehead group. This group may be seen as one existing of squarehead cultivars probably derived from a landrace, but either it was maintained as a landrace or obtained and maintained as an improved cultivar.

Zeeuwse landrace group

Landraces belonging to the Zeeuwse landrace group covered French and Belgian Flanders, the Dutch province Zeeland, (part of) Essex, Great Britain, and probably adjacent regions. Landraces belonging to this group are awnless, have white, glabrous glumes and white grains (var. *albidum*). They have a low winter hardiness.

Landraces, grown in the Netherlands and belonging to this group are in alphabetical order 'Chiddam', 'Engelse Witte', 'Essex Gladkaf', 'Goese', 'Hundredfold', 'Rousselaere', 'Smooth Chaffed Essex', 'Walcherse', 'White Essex', 'Witte Engelse Essex', '(Witte) Victoria (d'automne)', 'Witte van Vlaanderen', 'Zeeuwse' and 'Zeeuws-Vlaamse', and their synonyms.

Ruwkaf Essex landrace group

From Great Britain landrace material was introduced into the Netherlands, that was marked by awnless ears, pubescent, white glumes and white grains (var. *leucospermum*). The original material was probably grown in Essex. It is quite likely that this landrace group is closely related to a landrace group in Great Britain. It is also possible that this landrace group is related to the Zeeuwse landrace group. Landraces belonging to the Ruwkaf Essex landrace group and grown in the Netherlands are 'Blanc à duvet', 'Essex Ruwkaf', 'Fluweelkaf', 'Ruwkaf Essex' and 'White Essex', and their synonyms. They were grown in various regions in the Netherlands. It is quite likely that the period of adaptation to certain areas was too short, before they were replaced by better cultivars.

Gelderse and Ruige Kleefse landrace groups

In the 19th Century landraces belonging to two landrace groups from the regions around Cleve, Goch, and Geldern in West Germany were introduced into the Netherlands. These two groups are Gelderse and Ruige Kleefse. The Gelderse landrace group is characterized by awnless ears, red or white, glabrous glumes and red grains (var. *milturum* Körn. and var. *lutescens* Körn.), but owing to contamination awned plants occur. Ruige Kleefse is known from literature data only. It is the awned homologue of Gelderse, i.e. var. *ferrugineum* Körn. and var. *erythrospermum* Körn.

It is quite likely that these landrace groups are related. The same material may have been introduced into other parts of Germany and therefore these groups may have covered a large part of West Europe. Zeven (1986) showed that the Gelderse landrace group originated as an introduction from Eastern Europe. As no material is available of the Ruige Kleefse group in the Netherlands a decision could not been drawn. But investigation of related landraces, collected in West Germany, or their derivatives may enable a conclusion about the origin of this group. According to Werner (1885) related landraces were grown in the Rhine provinces of Germany and North-Eastern Germany. Similarly, the same material could have been introduced into the Netherlands from elsewhere. For instance 'Poolse' or 'Russische' could have been related to 'Gelderse'. Van Hall (1843) remarked that material from Mecklenburg, Germany

was identical to 'Gelderse Ris'. This material existed of var. *milturum* and var. *lutescens* plants.

Gelderse landrace group

The Gelderse landrace group includes the landraces 'Deris', 'Clevelandse', 'Friese', 'Gelderse (Ris)', 'Gelderse Rode', 'Gladde Ris', '(Groninger) Oldambtster', '(Groninger) Ommelander', 'Klare Ristarwe uit Kleefsland', 'Kleefse', 'Limburger', 'Limburgse ((kleine) rode)', 'Rode Gelderse (Ris)', 'Rode Gochse', 'Rode Ris', 'Rode tarwe', 'Rosse tarwe', and their synonyms. Their quite recent introduction at first into adjacent provinces Gelderland and Limburg, and from there to other parts of the Netherlands, must have resulted in an extended contamination with other extant landraces and impurity of the material. Hence, Mayer Gmelin could select various 'botanical varieties' from 'Gelderse Ris'.

Fig. 1. Probably representatives of the Ruige Kleefse landrace group. Left: an ear with brown glumes (var. *ferrugineum*); right: an ear with white glumes (var. *erythrospermum*). Collected in a cross-population of 'Gelderse uitzoeking 42' and 'Gelderse uitzoeking 48'.

Ruige Kleefse landrace group

In this group I include the landraces 'Angelris(t)', 'Clever Hochland Weizen', 'Echeltarwe', '(Rode) Hooglandse', 'Kleefse Ruwarige', 'Rode Baard', '(Rode) gebaarde Kleefse', 'Rode tarwe Westland', 'Ruigarige', 'Ruige tarwe' and their synonyms. Fig. 1 shows two representative ears.

Squarehead group

'Squarehead' was a wheat type discovered in 1865 in Great Britain. It was probably found in foreign material. Around 1870 'Squarehead' was introduced into the Netherlands. Although it may have been grown as a landrace it did not possess the landrace characters weak, long straw and lax ears. After its introduction the genotypic composition must have changed to adapt to growing conditions in the Netherlands. However, the period of cultivation (1870 – ca 1900) was too short to allow complete adaptation. Furthermore, sowing material was transported from one place to the other. Hybridisation and may be mutation must be the origin of white-grained and spring habit types.

The first improved cultivars were of the squarehead type, as this was the common type of that period. Hence Broekema (1933) named this group the Wilhelmina group.

Cultivar groups of the period 1924-1944

Two groups of improved cultivars have already been mentioned i.e. the Wilhelmina group and the Newest group. Especially the name of the latter is rather vague. As the annual Lists of Registered Agricultural Cultivars starting in 1924 provide scores for certain characters, to allow farmers to make a sound choice, are available, it was decided to use these data to carry out a cluster analysis (see Zeven et al., 1986 for details) of the bread wheat cultivars listed over 1924 to 1944. As starting with 1936 some earlier used characters were not mentioned anymore, and new characters were added, the data were separated into two periods viz. 1924-1935 and 1936-1944. Several were grown during in both periods and these facilitated an overview of the total period. These long lasting cultivars were the winter cultivars 'Carsten V', 'Emma', 'Imperiaal IIa', 'Invicta', 'Juliana', 'Kruisingsangel', 'Mendel', 'Robusta', 'Siegerländer', 'Trifolium', 'Vilmorin 27', 'Wilhelmina' and 'Wilobo', and the spring cultivars 'Extra Kolben', 'Heines Kolben', 'van Hoek' and 'Mansholt Witte'.

Cultivar groups of 1924-1935

From 18 winter and 4 spring cultivars scores of 19 characters (see annual Lists) were available for a cluster analysis. The first run resulted in two groups viz. the winter cultivars and the spring cultivars. When deleting the character winter hardiness no important changes occurred, except for the spring cultivar 'Heines Kolben' which joined the group of winter cultivars. When analysing the winter cultivars separately 'Siegerländer' formed a group apart.

Cultivar groups of 1936-1944

From 29 winter cultivars scores of 22 characters and from 6 spring cultivars scores of 21 characters (winter hardiness was not included anymore) (see annual Lists) were available.In the first run the 29 winter cultivars and in a second run all 35 cultivars (deleting winter hardiness) were analysed. The winter cultivars could be grouped into:

1. all winter cultivars except 'Siegerländer' and the French cultivars,
2. 'Siegerländer',
3. French and Belgian (winter) cultivars,

When analysing all 35 cultivars two groups were generated:

1. all winter cultivars except 'Picardie',
2. all spring cultivars and 'Picardie'.

Cultivar groups of 1924-1944: an overview

The above groups indicated that the spring cultivars were different from the winter cultivars. In the period 1924-1935 only one French (winter) cultivar ('Vilmorin 27') was listed. With the growing of more French winter cultivars in 1935-1944 a separate group of winter cultivars was introduced.

In both periods 'Siegerländer' formed a separate group. This German cultivar was selected from a landrace from Siegerland, Germany.

The remaining winter cultivars formed one large group, although several subgroups could be recognized. Hence the 40 cultivars of the period 1924-1944 could be classified into 4 groups:

1. spring wheat cultivars: 'Blanka', 'Carma', 'Extra Kolben', 'Heines Kolben', 'van Hoek', and 'Mansholt Witte',
2. the French (winter) cultivars: 'Benoist 40', 'Bersée, 'Chanteclair', 'Joncquois', 'Picardie', 'Vilmorin 27', 'Vilmorin 29', and 'Saint Pierre', and the Belgian 'Jubilé',
3. 'Siegerländer',
4. winter cultivars: 'Alba', 'Algebra', 'Astra', 'Carsten V', 'Elisabeth', 'Emma', 'Imperiaal IIa', 'Invicta', 'Jacob Cats', 'Juliana', 'Kruisingsangel', 'Lovink', 'Mansholts Dikkop III', 'Mendel', 'Prins Hendrik', 'Robusta', 'Skandia II', 'Staring', 'Trifolium', 'Waard en Groet', 'Wageninger', 'Wilhelmina', 'Wilma' and 'Wilobo'.

Sowing seed

Previous to about 1900 little information is available on the quality of sowing seed. It is assumed that farmers tried to obtain good sowing seed for instance by using the heaviest seeds, as the Romans already did. The heaviest fraction could be separated by throwing the seeds into the air, by winnowing, by sieving or as described below to obtain loose smut-free seeds.

There are a few reports on selection of sowing seed. For instance in the archives of the leprosy of Middelburg, Zeeland, dating from 1559, it is shown

that sowing seed was more expensive than bulk seed. This must indicate that sowing seed was of better quality than bulk seed. Hence this indicates that some sort of selection, maybe seed cleaning, was carried out by those who were selling sowing seed (Boerendonk, 1935). In the last century farmers, who were growing 'Zeeuwse', preferred to obtain sowing seed of this landrace from the island Walcheren. This material, although belonging to 'Zeeuwse' was known as 'Walcherse'. In around 1800 Mr. H. Ponse of province Zeeland indicated that sowing seed without the small seed fraction was better than sowing seed with this fraction.

The thousand grain weight of sowing seed could be calculated from data derived from Anon. (1866): it ranged from 21 to 87 g. The latter weight is very high.

It was experienced that the change of sowing seed supply within a landrace (group) was beneficial and would result in a higher yield. Hence some farmers tried to obtain sowing seed from a neighbouring village, or in the province Zeeland from a adjacent island. Although farmers tried to reduce the presence of smut in their field it was difficult to get rid of it and therefore they also tried to purchase new seed from (almost) smut free fields.

Diseases

In the old literature little reference is made to diseases. Maybe the multiline effect of a landrace and the presence of durable resistance to diseases like yellow rust resulted in a low disease effect. Partial and temperature sensitive resistance are major components of this durable resistance of landraces and old cultivars (van Dijk et al., 1988).

There is one exception which is loose smut caused by *Ustilago tritici*. Several reports mentioned that upto some 70% of the plants were affected and apparently all landraces were susceptible. Rosmolen (1839) suggested to use only the heaviest seeds as sowing seed. He also mentioned that diseased seedlings would be killed by frost. If so in the northern Netherlands less loose smut must have occurred. Several authors advised to soak for several days sowing seeds in liquids of salt (sea water), saltpetre, copper vitriol, or urine, and to remove the drifting seeds. It was said that the methods worked quite well, but the removal of infected seeds was not complete, which means that a part of the heavy seeds was also infected by loose smut. As mentioned above farmers would also buy sowing seed from elsewhere.

Loose smut must have been present in the Netherlands for a long time and one wonders why in the 19th century there was such an outbreak of this disease in the landraces. One cause could be the introduction of material susceptible to the Dutch races of loose smut. Another cause could be the introduction of some selection methods reducing the resistance of the selected material. A third cause could be the application of some new cultivation methods.

Wheat on 16th – 18th centuries paintings

Paintings made in Flanders and the present-day Netherlands in the 16th to 18th century inclusive can be used as a source of documentation of the evolution of domesticated crops (Zeven & Brandenburg, 1986). Several paintings show harvest scenes. But it is difficult to identify which cereal crop is harvested, and, when possible, it is difficult to recognize the wheat type grown, except maybe for the awnedness of the ear.

Wheat culms with an ear have been rarely painted. The cause of their frequent absence is not known to me. Fortunately, ears of a cereal had a Vanity meaning and therefore on a few Vanity paintings wheat ears are included.

In my documentation of paintings, depicting one or more wheat ears over the period 16th-18th centuries I have listed 39 paintings by 18 artists (see Table 1). As I have not seen the originals of all paintings the true colour of the ear is not always known to me. And even when I could study the original, dirt and layers of oxidized varnish had browned the colour. Similarly, when a coloured reproduction is available the colour of the reproduction may differ from the original. However, when an original shows a whitish ear I have assumed this to be the right colour. Original, coloured and black-and-white reproductions can be used to study the ear shape and show whether the ear is awned, awnletted or awnless.

I do not know the way an artist obtained his wheat ears to be painted. Did he find a few plants growing at the port site or near a flour mill, or did he pick them from a wheat field? Maybe the wheat plants growing at the port site originated from lost seeds imported from distant or close places. The same is true for the plants found near a flour mill. With this in mind it remains interesting to study the depicted wheat ears.

In table 1 I have presented the number of ears, their awnedness and resemblance with landraces of ca 1850. It is remarkable that the ears marked as 'Gelderse'-like resemble a landrace not yet introduced into the Netherlands at the time the paintings were made! Omitting the two paintings with either a bundle (Provoost, de Heem) or a sheaf (Brueghel) on 37 paintings I counted some 113 awnless, 1 awned, 1 awnletted and 2 top-awned ears. After adding Provoost's bundle (ca 16 awnless ears), Jan de Heem's bundle (ca 30 awnless ears) and Brueghel's sheaf (ca 30 awnless and ca 6 awned ears) it is concluded that most ears are awnless as it is today. Several ears resemble the ear shape of landraces belonging to the Zeeuwse landrace group and a few to those of the 19th century Gelderse landrace group. Apparently types similar to 'Gelderse' were grown in the Netherlands in the 17th and 18th centuries. The painting by Provoost probably depicts a wheat seed merchant (De Vos,1979). His patron saint, St. Nicholas, holds a bundle of ca 16 'Zeeuwse'-like ears. Ears on other paintings may resemble ears of landraces grown at that time and hitherto unknown or may resemble exotic wheat plants. Some ears have a brownish appearance. This is especially clear from the painting by Mignon which also has whitish and pale

Table 1. Pre-1800 paintings including wheat ears and a description of the ear type.

Artist	*Period*	*Region*	*Description*
Anonymous	ca 1525	N.Netherlands	1 awnless, pale brownish ear
Anonymous	17th C	N. or S. Netherlands	16 awnless 'Zeeuwse'-like ears
Brueghel, Jan Sr	16th C	Flandres	ca 30 awnless (incl. 'Zeeuwse'-like) and 6 awned ears
Coorte, Adriaan	17th C	Zeeland	1 awnless 'Zeeuwse'-like ear
de Gheijn, J. II	1565-1627	N.Netherlands	3 awnless, small (1 'Zeeuwse'-like) ears
de Heem, Cornelis	1631-1695	N.Netherlands/ Flandres	2 paintings, together 6 awnless, brownish ears
de Heem, Jan D.	1606-1683/4	Utrecht	9 paintings with 1 to 5 ears; 1 painting with a bundle with ca 30 awnless ears; 1 painting with 1 top-awned and 1 awnless ear; some ears are 'Zeeuwse'-like.
Mignon, Abraham	1640-1679?	Utrecht	6 paintings with 1 to 6 awnless ears, 2 paintings show a mixture of whitish and pale brownish ears
Morel I, J.E.	1769-1808	Amsterdam	3 awnless 'Zeeuwse'-like ears
Mortel, J.	1650-1719	Leiden	2 paintings: 1 painting with 2 awnless 'Zeeuwse'-like ears, 1 painting with 1 awnless and 1 awned ear
Provoost, Jan	1485-1519	Brugge	a bundle with ca 16 awnless 'Zeeuwse'-like ears
de Ring, P.	1615-1660	Leiden	ca 13 ears: 6 awnless ears of 2 'Zeeuwse'-like and 2 'Gelderse'-like some pale brownish with 1 top-awned ear
Roeding, J.C.	1751-1802	Den Haag	2 paintings each with 1 'Zeeuwse'-like ear; 1 painting with 1 awnless ear
Ruijsch,R.	1664-1750	Amsterdam	3 awnless ears with lost spikelets
Schoock, H.	1630-1707	Utrecht	2 awnless ears
Seghers, Daniel	1590-1661	Antwerp	ca 12 awnless 'Zeeuwse'-like ears

Table 1 (continued).

Artist	*Period*	*Region*	*Description*
van Walscapelle, J.	1644-1724	N.Netherlands	1 painting with 1 awnletted brown ear, 1 painting with an awnless ear
Weerts, H.	17th C	?	3 awnless 'Gelderse'-like ears

* 'Gelderse'-like indicates that the ear resembles the ear of the 19th century landrace 'Gelderse'.

two 'Gelderse'-like ears and some brownish ears of which one is top-awned. As I do not know the colour of the grains it is not possible to classify the ears according their botanical variety.

I conclude that in the period 16th-18th centuries the awnless ear type was the Ghemeijne Terwe (see Inventory) and that landraces belonging to the 'Zeeuwse' landrace group were already present at that time. Most of the depicted ears were 'Zeeuwse'.

Linnaeus' *Triticum hybernum* of Dutch origin?

In The Herbarium Cliffortianum of the British Museum, London, contains two sheets with ear culms. One sheet (Herb. Cliffort. 24 *Triticum* 3) carries two culms, each with an awned ear. The other (Herb. Cliffort. *Triticum* 2) carries three culms, each with an awnless ear. Hanelt et al. (1983) assigned the first specimen as the lectotype of the spring wheat *Triticum aestivum* L. They also stated that this type resembles the ears of bread wheat landraces of East Europe. I fully support this statement. And hence they also resemble landraces, grown elsewhere, which were derived from these East-European landraces. It is also similar to'Ruige Kleefse', although this is a winter wheat. Hanelt et al. (1983) declared the second specimen as the lectotype of the winter wheat *Triticum hybernum* L. Clifford who lived and worked near Haarlem and Amsterdam may or may not have obtained the spring wheat from seeds, brought to a port such as Amsterdam. The same may be true for the winter wheat. But Clifford's 'Triticum hybernum' resembles wheat plants belonging to one of the landraces of the Zeeuwse landrace group. If so, Clifford may have obtained his winter wheat from a wheat field in (West) Netherlands. Hanelt et al. (1983) stated that 'T. hybernum' probably belongs to var. *lutescens*. If my supposition is correct this specimen belongs to var. *albidum*. The difference is the red and white colour of the grains, respectively.

Triticum specimens in the Rijksherbarium at Leyden

In the National Herbarium at Leyden some 200 *Triticum* specimens are conserved. They can be roughly divided into some 140 'cult.' (cultivated) specimens and some 60 specimens which were collected at various socalled 'wild' sites like ports, road sides, waste places (Figs. 2 and 3) or of undescribed sites (Fig. 4). The identification of some specimens needs confirmation. Among the 140 'cult.' specimens some were collected in the demonstration garden of Van Hall (Fig. 5), which he maintained around 1830 at Groningen-City. Among them some are named cultivars. Those with a 'cult.' origin also contain 5 modern cultivars which were grown in the Netherlands around 1960. No other of the many cultivars grown since 1900 in the Netherlands have been included in the Herbarium despite the fact that each year 20 thousands of millions bread wheat plants are cultivated.

Fig. 2. Volunteer wheat plant (var. *erythrospermum*) collected at Wormerveer near a flour mill in July 1916. Herbarium J.Th. Henrard (L: 928.354-47).

Fig. 3. Volunteer wheat plant, collected at Oegstgeest near Leiden on August 10, 1886. Left: probably 'Ruwkaf Essex', right: probably 'Zeeuwse'. Herbarium F.J. Struykenkamp s.n. (L: 928.14-141).

Some of the specimens collected on 'wild' sites have probably been sent to the Herbarium for identification. Some of these are plants from infertile sites and have therefore a depauperate appearance. Maybe that is the reason that they were not recognized by the collectors as wheat plants. Other plants are well developed. In only one instance, 1928, it is stated by the collectors that 'this type closely resembles the cultivated Zeeuwse' (specimen 992-1928).

In conclusion, most specimens collected before 1900 can be identified as 'Gelderse' or 'Zeeuwse'. More recently made collections often resemble 'Wilhelmina' and other cultivars, but a detailed research would be necessary to draw conclusions. However, the present collection does not give a complete picture of the landraces and cultivars of bread wheat and of other wheat types ever grown in the Netherlands, since these were not systematically collected and preserved.

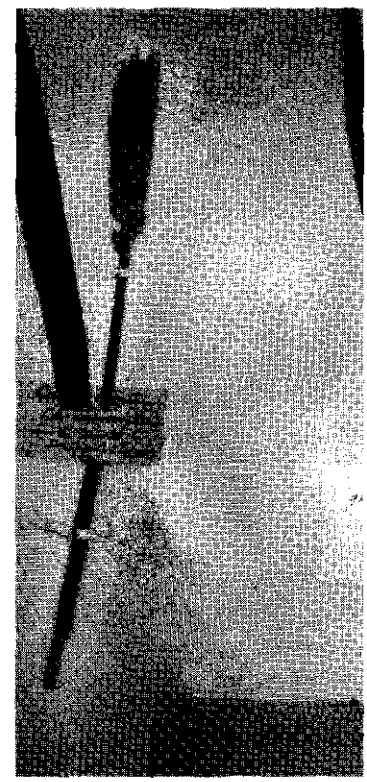


Fig. 4. Plants collected at Westduinen near The Hague on July 14, 1898 . Except for the red grains, the ears resemble those of 'Zeeuwse'. The left ear shows symptoms of *Septoria* blotch. Herbarium P.J. van Breemen (L: 910.286-772).

Fig. 5. A plant grown from seed obtained by Van Hall on the market of Groningen-City. He identified the material as 'Zeeuwse', but later he crossed this word again (L: 90897-1684).

Wageningen wheat collection

During the period 1964 – 1986 I attempted to make a living collection of Dutch wheat cultivars. The nucleus was a collection of the Department of Plant Breeding (I.v.P.), Wageningen Agricultural University. Other material was obtained from wheat collections elsewhere in the world. In 1987 this collection was handed over to the Centre of Genetic Resources (CGN) at Wageningen, where seeds are kept in cold storage.

Herbarium specimens are conserved at the University Departments of Plant Breeding and Plant Taxonomy (Herbarium Vadense, WAG).

Inventory of landraces and cultivars

Legenda

Botanical varieties

Botanical variety	Characters 1	2	3	4
albidum	–	–	–	–
alborubrum	–	–	+	–
barbarossa	+	+	+	–
delfii	–	+	+	–
erythroleucon	+	–	+	–
erythrospermum	+	–	–	+
ferrugineum	+	–	+	+
graecum	+	–	–	–
hostianum	+	+	–	–
leucospermum	–	+	–	–
lutescens	–	–	–	+
meridionale	+	+	–	+
milturum	–	–	+	+
pyrothrix	–	+	+	+
turcicum	+	+	+	+
velutinum	–	+	–	+

Character 1 awns: + present, – absent
character 2 hairy chaff: + = present, – = absent
character 3 red coloured chaff: + present, – absent
character 4 red grain colour: + present, – absent.

The author of all botanical varieties is F. Koernicke.

Yield data

Literature provides several yield data. It should be remembered that probably many were obtained from small farm plots, where optimal growing conditions for the plants were provided. The obtained figures were converted to kg/ha. Furthermore, when the hectoliter weight (hl wt) was available I used as hl wt 70 kg. Therefore the kg/ha figures should be seen as an indication. Furthermore, a seed trader may have obtained a high hl wt by pressing the seeds. This would give him a high figure to be used in advertisements.

RL

Some literature references include the code RL and two years. This means that the cultivar was listed on the *R*ecommended *L*ists of Agricultural Varieties, published since 1924. Some improved cultivars were already not recommended

before 1924 and have not been listed, while others overlap. The first years of cultivations of these last cultivars are marked by ( ). So RL(1917)-1924-1936 means that this cultivar was grown from 1917 onwards and was listed on the RL lists from 1924 to 1936 (last year of recommendation).

Spelling of vernacular names

Before 1940 the spelling of cultivar names was different from the one used after that year. But the new, official spelling was not immediately adopted by everybody. In our Inventory I have used the new spelling. The two major differences are: Roode becomes Rode, and names as Zeeuwsche, Geldersche, Kleefsche become Zeeuwse, Gelderse, Kleefse. But ch after s such as in Pruisische remains unchanged. So in the old literature one has to look for Zeeuwsche Roode, Roode Pruisische, Geldersche Roode, while it is in the modern spelling Zeeuwse Rode, Rode Pruisische, Gelderse Rode.

Provinces

Before 1944 there were 11 provinces in the Netherlands: Groningen, Friesland, Drente, Overijssel, Gelderland, Utrecht, Noord-Holland, Zuid-Holland, Zeeland, Noord-Brabant and Limburg. Names of two provinces may be confusing as they carry the same name as the capital of that province. When I refer to a province I will do so without further indications. The capitals will be named Groningen-City and Utrecht-City.

Illustration of pedigrees

The illustration of a pedigree is done as proposed by Purdy et al. (1968, see also Zeven & Zeven-Hissink, 1976).

—— ○ ——

'Achtrijige rode wintertarwe' (Eight-rowed red winter wheat)

A winter wheat, found by D. Buijs at Dinther, Noord-Brabant in 'Gewone Ristarwe' (see 'Gelderse Ris') and multiplied as the parental plant possessed 4 grains per spikelet. This type was also found by H.C. van Hall in 'Witte tarwe'.

Lit.: Anon:, 1855; Uilkens, 1864.

Picture in Landbouw-Courant 185 no 30.

'Addens'

A winter wheat selected by N.G. Addens at Bellingwolde, Groningen from a 'Belgian wheat', with a high baking value. Winter wheat with good cold resistance, good yield viz. 40 hl/ha (2720 kg/ha), fairly stiff medium length straw.

Lit.: Anon., 1923.

'Alba'

Var. *albidum*. Selected from the cross 'Tresor'/'Jacob Cats', made in 1928

by A.G. Dumon, Heverlee,Belgium. Good grain quality, slightly susceptible to yellow rust.

Lit.: RL1939-1960; Anon., 1955; Larose et al., 1956; Jonard & Simon, 1961.

'Algebra'

Var. *albidum*. A winter wheat bred by L. Broekema from the cross 'Wilhelmina'/'Willem I', made in 1903. It is similar to 'Wilhelmina', but ripening a little later. This cultivar possessed durable resistance to yellow rust (van Dijk et al., 1988). It had a low winter hardiness.

Lit.: RL(1917)-1924-1935; Anon., 1955; Meijers, 1933; van Dijk et al., 1988.

'Alkmaarse'

Probably a landrace from the Alkmaar region, Noord-Holland. Good wheat.

Lit.: Gevers Deynoot, 1843; van der Trappen, 1843.

'Amerikaanse tarwe' (American wheat)

Tested in Overijssel: good wheat.

Lit.: Anon., 1852.

'Angelris'

Tested in Noord-Brabant. Farmers of Noord-Brabant obtained fresh sowing seed from Germany; they preferred sowing seed from the Cleve or Goch area.

Synonyms: 'Angelrist', 'Gebaarde ris', 'Ruwarige ris', '(awned) Risweit' (Gelderland), 'Kleefse weit' (Gelderland), 'rode Pruisische' (Noord-Brabant).

Lit.: Schiffer, 1843; Uilkens, 1864; Troost, 1920.

'Angelrist'

See 'Angelris'.

'Anna Paulowna'

Tested in the same period as 'Algebra' en 'Van Hoek'.

'Aragoa'

See 'Arragoa'.

'Arragoa'

Material sent by the Dutch consul at Caracas, Venezuela and tested as spring wheat. The coleoptiles resembled those of rye, and the ears those of barley. Its awns repelled birds better than the awnless cultivars. It had strong straw like that of 'Rode Gelderse', being 75 cm long.

The yield was 40 mud/bunder (= c 2700 kg/ha) in Thamen aan de Amstel. In The Hague, Zuid-Holland and Wieringermeer, Noord-Holland the crop failed. Owing to drought the multiplication factor was 5.6 only, but in the Anna Paulownapolder it was 12.5.

Mr. A. Geluk J.Azn tested seed collected in the 'Arragoa valley in Carraccas

in Columbia', which he had obtained via Scotland. The result was a low yield.
Synonym: 'Aragoa'.
Lit.: Anon., 1852, 1855; Uilkens, 1864; Geuze, 1950.
Comment: maybe this cultivar was a durum wheat.

'Astra'
A winter cultivar bred by A. Dumon, Heverlee, Belgium from the cross 'Tresor'/'Svalöf's Stal' (syn. 'Staal'), made in 1928. Good winter hardiness, low demanding, long but adequately strong straw. Yield too low on good soils.
Lit.: RL1943-1949; Anon., 1955.

'Australische fluweel-arige tarwe' (Australian velvet-ear wheat)
A spring wheat. It gave for that time a high yield: on average 40 hl/ha, i.e. ca 2800 kg/ha. This high yield was promoted by the good summer weather in 1868. It had shorter straw and lodged less than 'Zeeuwse'. It quickly degenerated and new seed had to be imported from England. See 'Australische tarwe'.
Lit.: Anon., 1869.
Synonym: 'Essex'.

'Australische guldenweit' (Australian golden wheat)
A *T. turgidum* wheat that only occurred in the Landhuishoudelijke Tuin (garden of economic crops), at Groningen-City.
Lit.: van Hall, 1854.

'Australische tarwe' (Australian wheat)
It is likely that several introductions from Australia were made and that (almost) each of them were named 'Australische tarwe'. We recognize three types: 1. an red grained type, 2. a white grained type, and 3. pubescent type with a winter habit. The name suggests an Australian origin, but this is probably not true for the wintertype, which is likely 'Essex fluweelkaf'.
Kakebeeke (1853) used white-grained seed of 'Australische tarwe' imported from van Diemensland (now Tasmania). The culm length was 120 cm. The average annual yield over the period 1846-1850 was 3105 kg/ha and 1615 sheaves/ha. The hl weight was 76.18 kg.
Anon. (1859a) stated that 2 hl (some 140 kg) 'Australische tarwe' came from Australia and that it was offloaded in Ostend, Belgium. He did not describe the type. According to Gerlach (1885) 'Rode Australische' was a spring wheat. 'Australische tarwe' was tested at several sites in the Netherlands. It has strong, moderately long straw, the ear had a good appearance and the red grains were well filled. It had a low frost resistance and therefore it was frost killed in Friesland in 1861. But in regions with less severe winters, like those in Zeeland it was still grown in 1870. There the yield could be 40-50 mud/ha, i.e. 2800-3500 kg/ha. Another yield figure is from Hulst, Zeeland. There Australische tarwe yielded 6045 kg/ha of seed and 5755 kg/ha straw. Using these figures the harvest index would be 51. All these figures are unbelievably high. At Diksmuijde, Zee-

land the yield was 2800 kg/ha. The crop was a few days earlier than 'Rode tarwe'. Furthermore, it had a poor tillering capacity. Later the red grained type was replaced by white grained 'Engelse tarwe'. Large farms could grow this cultivar because of its earliness, which enabled farmers by growing more cultivars to extend the harvesting time.

A white grained type came from an exhibition at London. In 1863 it severely suffered from (yellow?) rust after which no grain was harvested.

Lit.: Kakebeeke, 1852, van Hall, 1854; Anon., 1858a, 1859b, 1860, 1864; Uilkens, 1864; Hartog, 1867; Gerlach, 1885; Troost, 1920.

'Baardtarwe' (Bearded wheat)

Any awned wheat, but more specifically a form of *T. turgidum* or *T.durum*. Strong, long straw, awned ear (long awns), high yield, low baking quality. Grown around 1870 at several places, but as it fetched a lower price than bread wheat it disappeared.

Synonyms: 'Rode tarwe', 'Ropstarwe', 'Rivetts', 'Canada wheat', and probably 'Australische guldenweit'.

Lit.: Anon., 1855, 1868; Uilkens, 1864; Heidema & Dijkema, 1871; Troost, 1920.

'Bamis'

A spelt (*T. spelta*) cultivated sporadically in Noord-Brabant as a winter crop and rarely as a spring crop. In the severe winter of 1739/40 it appeared to be frost resistant.

The name Bamis is a corruption of the Baafmis day – the 1st of October – the holy day of St. Bavo. The crop was sown on or near that day.

Lit.: Dewez, 1958.

'Batauwe'

Var. *albidum*. Bred by the Institute of Plant Breeding (I.v.P.) at Wageningen, which was founded in 1912. However, the cross 'Squarehead'/'Gelderse Ris'// 'Squarehead' or 'Essex Bastaard'/ 'Gelderse' was already made in 1905. A late maturing, frost and sprouting-in-the-ear sensitive cultivar.

Lit.: RL1930-1934; de Haan, 1957.

'Benoist 40'

Var. *lutescens*. A winter cultivar selected in 1925 by C. Benoist, Orgerus, France from the cultivar 'Wilson'.

Synonym: 'Hybride 40'.

Lit.: RL1939-1941; Jonard 1951; Larose et al., 1956; Jonard & Simon, 1961.

'Bersée'

See 'Hybride de Bersée'.

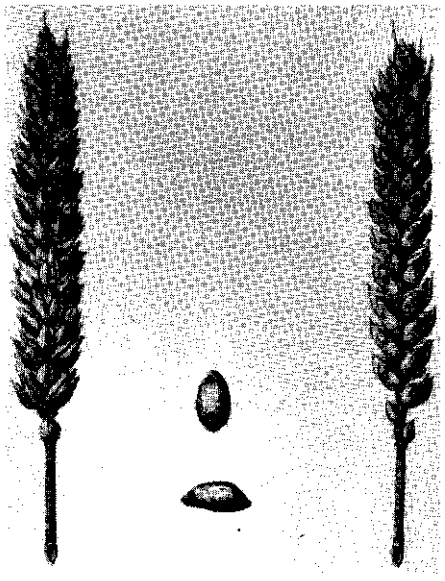


Fig. 6. 'Blanc à duvet'. From: Vilmorin (1880).

'Betuwse tarwe'

A landrace from the Betuwe and adjacent Tielerwaard, Gelderland. Tested and compared with 'Wittington'.

Synonym: 'Tielerwaardse tarwe'.

Lit.: Schiffer, 1843; Uilkens, 1864.

'Blanc à duvet'

Var. *leucospermum*. Fig. 6. Probably introduced from Essex, U.K. into the Netherlands and France. It resembles the English landraces 'Old Hoary', 'Essex Rough Chaff', and 'Velvet Chaff White'. They are probably related to each other.

Synonyms: 'Blé à duvet', 'Blé velouté', 'Wooly eared wheat', 'Rough chaff white wheat'.

Lit.: Vilmorin, 1880; Percival, 1921.

'Blanka'

Var. *albidum*. A white-grained spring wheat, bred by Svalöf AB, Svalöv, Sweden from the cross 'Wilhelmina'/'Extra Kolben II', made in 1916. It was especially cultivated in North-Groningen.

Lit.: RL1934-1955; de Haan, 1936; Larose et al., 1956; Corbaz, 1966.

'Blé blanc de Flandres'

See 'Witte van Vlaanderen'.

'Blé à duvet'
Synonym: 'Blanc à duvet'.

'Bonte Poolse tarwe' (Pied-grained Polish wheat)
A red-grained wheat, imported and tested by the dept. Over- Betuwe, Gelderland in 1850. Poolse refers to Poland as origin.
Lit.: Anon., 1855.
Comment: Bonte refers to the grains being mottled with floury and glassy parts.

'Bonte weit' (Pied-grained wheat)
According to Knoop (1753) this type was grown in Europe.
Lit.: Knoop, 1753.
Comment: Bonte refers to the grains being mottled with glassy and floury parts.

'Bordeaux-bastaard'
An awnless (*albidum*) (rarely awned, *graecum*) derived from the cross 'Ruwkaf Essex'/'Blé rouge inversable', made by O. Pitsch. Strong, moderately long straw, white well-shaped grains of very good baking quality, good yield. Especially grown in Zeeland and spread from this province to other provinces.
Synonyms: 'Witte Bordeaux', 'Essex-bastaard'.
Lit.: ten Rodencate, 1907; Troost, 1920; de Haan, 1957.

'Botha'
Selected by L. Broekema from the same cross as 'Wilhemina'. Tested in Zeeland in 1905-1909. Good straw, lodging resistant, beautiful grain, good yield. Despite these good characteristics apparently not grown.
Lit.: ter Haar, 1914; Troost, 1920.

'Bovenlandse'
A landrace – maybe a synonym of 'Pruissische' – once cultivated in Maas-en-Waal, Gelderland. The name may refer to Hochland, Cleve.
Lit.: Engelberts, 1847.

'Braaklandse tarwe' (Fallow land wheat)
In fact the name means that the wheat crop was grown on land that had lied fallow in the previous growing season. But apparently it also was a landrace and if so it belonged to the Zeeuwse group of landraces. Around 1860 the yielding capacity of 'Braaklandse tarwe' was compared with 'Whittington' and 'Eenlandse tarwe':

'Whittington' 43 Ned. mud/ha (c 3000 kg/ha)
'Braaklandse' 40 Ned. mud/ha (c 2800 kg/ha)
'Eenlandse' 36 Ned. mud/ha (c 2500 kg/ha).
Lit.: Faase, 1843; Uilkens, 1864.

'Brabandse' (from Brabant)
Mentioned as a good wheat. Probably a landrace.
Lit.: Gevers Deynoot, 1843; van der Trappen, 1843.

'Breedaar'
Bred by O. Pitsch at Wageningen from the cross 'Zeeuwse'/ 'Squarehead'.
Lit.: Mansholt, 1903; Troost, 1920.

'Breslauer zomertarwe' (Spring wheat from Breslau/Wrocław)
An awnless, smooth-chaffed cultivar with yellow glassy grains and a low yield. It could be grown as spring-sown emergency crop.
Lit.: ten Rodencate, 1907.
Comment: Its name suggests that this spring wheat was introduced from Breslau/Wrocław region, Poland.

'B.R.I.'
Var. *lutescens*. A winter wheat.
Lit.: Anon., 1955.
Comment: The initials probably refer to the cross made or to another cultivar for instance 'Blé Rouge Inversable'.

'Broekema's Wilhelmina'
Synonym: 'Wilhelmina'. Lit.: ter Haar, 1914.

'Brooyman's gebaarde' (Brooyman's bearded)
Var. *lutescens*. Probably bred by a Mr. Brooymans.
Lit.: Anon., 1955.

'Bruinstro tarwe' (Brown straw wheat)
Synonym: 'Roodstro tarwe'.

'Californische tarwe' (Californian wheat)
Tested in 1872/73 in the Veenkoloniën, Groningen.
Lit.: Kok, 1948.

'Canada tarwe' (Canada wheat)
See 'Kanada tarwe'.
Synonym: 'Baardtarwe', 'Kanada tarwe'.
Lit.: Troost, 1920.

'Carma'
A small- and red-seeded spring wheat, derived from the cross 'Heines Kolben'/ 'Carstens Dikkop V', made in 1922 by R. Carsten, Schwartau near Lübeck, Germany. It produced many ears per sq.m. It had a good baking quality.
Lit.: RL1938-1950; Feekes, 1941.

'Carsten V'
See 'Carsten's Dikkop V'.

'Carsten's Dikkop V' (Carsten's Squarehead V)
Var. *lutescens*. A squarehead winter wheat cultivar bred by R. Carsten, Schwartau, Germany from the cross 'Carsten's III'/'Dickkopf'//'Dickkopf'/'Criewener no 104', made in 1909. Very good winter resistance, lodging sensitive, low requirements, low yield. Grown on the drought sensitive 'esgronden' in Westerwolde, Groningen, as it also was quite drought tolerant.
Lit.: RL1932-1957; Muntinga, 1945; Feekes, 1941.

'Carwito 40'
A winter cultivar bred from the same cross as 'IvP 45'. It never made the List of Recommended Varieties.

'Ceem-tarwe'
Synonym: 'Zeem-tarwe'.

'Ceres'
var. *albidum*. Fig. 7. The caption of the figure states as pedigree 'P2'/'Witte Dikkop'//'P2'/'Rode Bastaard'/3/'Mains Standup'/'Rode Bastaard'/4/'Zeeuwse'/'Squarehead'. 'P2' is unknown to me.
Lit.: Anon., 1955.

Fig. 7. 'Ceres'. Coll. Dept. of Plant Breeding-IvP, Agric. Univ. Wageningen.

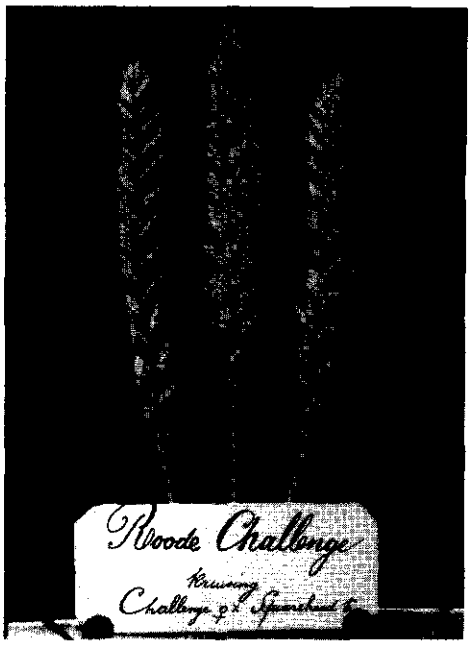


Fig. 8. 'Challenge bastaard', syn. 'Rode Challenge'. Coll. Dept. of Plant Breeding-IvP, Agric. Univ. Wageningen.

'Challenge bastaard'
A winter wheat, bred by O. Pitsch from the cross 'Challenge'/ 'Squarehead'. Fig. 8.
Synonym: 'Rode Challenge'.
Lit.: Mansholt, 1903.

'Challenge bastaard VI'
Var. *albidum*. Dutch cultivar.
Lit.: Anon., 1955.

'Challenge bastaard variatie'
Var. *albidum*. Probably found in 'Challenge bastaard'. Dutch cultivar.
Lit.: Anon., 1955.

'Challenge tarwe'
Synonym: 'Witte Victoria'.

'Champion'
A British winter cultivar traded by E. van den Bosch at Goes, Zeeland in 1899. The hl weight was 82 kg and it yielded 42-46 hl/ha, i.e. ca 3600 kg/ha.
Lit.: van den Bosch, 1899.

'Champion du Nord'

According to Flandrin (1949) this cultivar was bred by the Institute of Plant Breeding (I.v.P.), Wageningen. However, there no records are found. Furthermore its French name suggests another origin. It is likely that Flandrin confused this cultivar with the Dutch cultivar 'Concurrent'.

In Australia a cultivar with the same name or with its translated name 'Northern Champion' was described. Its origin was unknown or it had been selected from 'New England Champion'. 'Champion du Nord' has been a breeding parent of the Australian cultivar 'Currawa'.

Synonym: 'Northern Champion'.

Lit.: Flandrin, 1949; MacIndoe & Brown, 1958.

'Chanteclair'

Var. *lutescens*. A winter cultivar selected from the cross 'Hâtif inversable barbu'/a line of 'Hybride des Alliés' by Tourneur Frères, Coulommiers, France, made in 1921.

Lit.: RL1938-1949; Jonard, 1951; Larose et al., 1956.

'Chiddam'

Var. *albidum*. An old English cultivar introduced from a village Chidham, U.K. into Normandy, France. There the name became corrupted to 'Chiddam'.

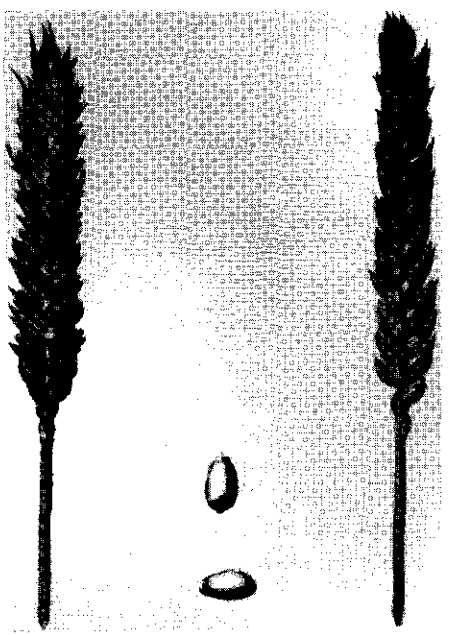


Fig. 9. 'Chiddam d'automne à épi rouge'. From: Vilmorin (1880).

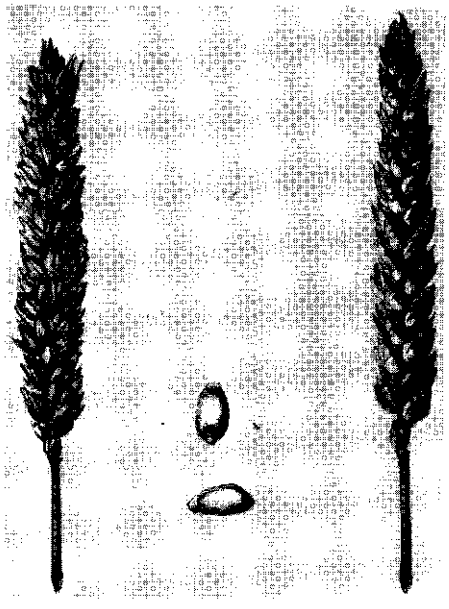


Fig. 10. 'Chiddam', syn. 'Chiddam d'automne à épi blanc. From: Vilmorin (1880).

In Normandy two winter types were selected: 'Chiddam d'automne à épi rouge' (Fig. 9, var. *milturum* and 'Chiddam d'automne à épi blanc' (Fig. 10, var. *albidum*). From France seeds were obtained by A. Kakebeeke Jzn at Krabbendijke, Zeeland. The white-chaffed material was used for an exhibition at The Hague in 1851. The Hollandsche Maatschappij voor Landbouw bought a 1/2 last (probably 500 kg) which was distributed among the farmers. It belongs to the Zeeuwse group of landraces. It resembles 'Witte Victoria', and 'Gladkaf Essex'. Grown in Zeeland, Noord-Brabant, Zuid-Holland and Noord-Holland around 1850. Still found around 1900. Due to lack of maintenance it had degenerated. Due to wet weather Kakebeeke obtained only a yield of 16 mud/bunder (1600 kg/ha), but Broekema (1899) obtained 2695 kg/ha.

Winter hardy, but also grown as a spring wheat. White fairly long, strong straw, glabrous chaff, white, long, thin, floury grain, quite productive.

Synonyms: 'Chiddam White', 'Chidon', 'Chidum', 'Chidub'.

Lit.: Anon., 1852, 1855; Uilkens, 1864; Vilmorin, 1880; Jongkindt Coninck, 1882; Werner, 1885; Reinders, 1893; Broekema, 1899; ten Rodencate, 1907; Troost, 1920; Percival, 1921; Jonard, 1951.

'Chidon tarwe'

A synonym of 'Chiddam'. Tested at Dordrecht, Zuid-Holland in 1852 under this name. Due to wet weather the yield was low, viz. 16 mud/ha, i.e. ca 1100 kg/ha.

Lit.: Anon., 1852; Uilkens, 1864.

'Chidub'
A synonym of 'Chiddam'.
Lit.: Geuze, 1950.

'Chidum'
A synonym of 'Chiddam'.

'C.L.A.'
Var. *lutescens*. A Dutch cultivar.
Lit.: Anon., 1955.
Comment: The initials probably refer to a cross.

'Claudius'
Var. *lutescens*. A winter cultivar selected in 1933 by the Institute of Plant Breeding (I.v.P.), Wageningen from a landrace. It was on the List of Recommended Varieties.

'Clevelandse tarwe' (Cleveland wheat)
A landrace grown around Utrecht-City and Amersfoort, Utrecht in the middle of the 19th century. It probably belonged to the Gelderse landrace group and probably orginated from Cleve area.
Lit.: Anon., 1860.

'Clever-Hochland Weizen' (Cleve highland wheat)
See 'Rode Tarwe Westland'.

'Concurrent'
Var. *albidum*. Bred by the Institute of Plant Breeding (I.v.P.), Wageningen from the cross 'Willem I'/'Wilhelmina'//'Wilhelmina', made in 1905. A strong, leafy plant, but not exceeding 'Wilhelmina'.
Lit.: RL1929-1935; de Haan, 1957; Anon., 1955.

'Cubanko'
Tested in Zeeland in ca 1863. It was reported to have a high bushel weight.
Lit.: Boerendonk, 1935.
Comment: Probably the durum cultivar Kubanka.

'Deris tarwe'
Grown in Noord-Brabant.
Synonym: 'Kleefse'.
Lit.: Uilkens, 1864.

'de Wet'
A winter cultivar, bred by O. Pitsch.
Lit.: Pitsch, 1909.

'Diekhuis'

Selected by Mr. E. Diekhuis, Oldehove, Groningen from a surviving plant of a field with frost-killed 'Wilhelmina'. Long, stiff straw, red grain, cold resistant, good yield, in demand for soils not adapted for wheat growing. Some cultivation in Friesland and Groningen.

Synonym: 'Diekhuis I', 'Diekhuistarwe', and possibly 'Verbeterde Wilhelmina'.

Lit.: Troost, 1920; Anon., 1923.

'Dikkoptarwe' (Squarehead wheat)

The name 'Dikkoptarwe' has been used for various cultivars like 'Engelse Dikkop' (Jongkindt Coninck, 1882), 'Rough Chaffed Essex' (Werner, 1885), 'Witte Engelse Essex' (Gulick, 1885), 'Witte Dikkop' (Reinders, 1893), and 'Rode Dikkop' (Troost, 1920).

Lit.: Jongkindt Coninck, 1882; Gulick, 1885; Werner, 1885; Reinders, 1893; Troost, 1920.

Dinkelkoorn

According to Knoop (1753) dinkelkoorn includes *T. monococcum*, *T. dicoccum* and *T. spelta*. But in general dinkelkoorn was a vernacular name for spelt.

Lit.: Knoop, 1753.

'Donkergele' (Dark yellow)

A name for various landraces. Anon. (1826) said 'donkergele weit' is 'rode weit' in Betuwe, Gelderland. Van Hall (1854) refers to it as 'rode' or donkergele. Van Hall (1864) described 'donkergele' as belonging to the same landrace to which the awned cultivars 'Ruige' and 'Kleefse' also belong.

Lit.: Anon. 1826; Van Hall, 1854, 1864.

'Duitse Rys'

According to de Lobel (1581) and Knoop (1753) a type of spelt. De Lobel stated that it had 'half virtue', meaning probably that the value of this crop was the half of that of ordinary wheat. See spelt.

Synonym: Rys spelt.

Lit.: de Lobel, 1581; Knoop, 1753.

'Duivendaal'

Var. *albidum*. Fig. 11. Bred by L. Broekema from the cross 'Zeeuwse'/ 'Squarehead'. A white-grained cultivar occasionally with red grains (var. *lutescens*). White, long, heavy straw, lodging resistant, squarehead ear. Yield similar to 'Squarehead', but of better quality. A line 'Duivendaal IV' (Fig. 12) yielded 3450 kg/ha around 1900. The straw is stronger than that of 'Hundredfold' and 'Prolific'. From the same cross Broekema also obtained 'Witte Dikkop I', 'Witte Dikkop II' and 'Witte Dikkop III', and from the reciprocal cross the cultivar Spijk.

Fig. 11. 'Duivendaal'. Coll. Dept. of Plant Breeding-IvP, Agric. Univ. Wageningen. Drawing made for the 4th edition of Reinders (1893).

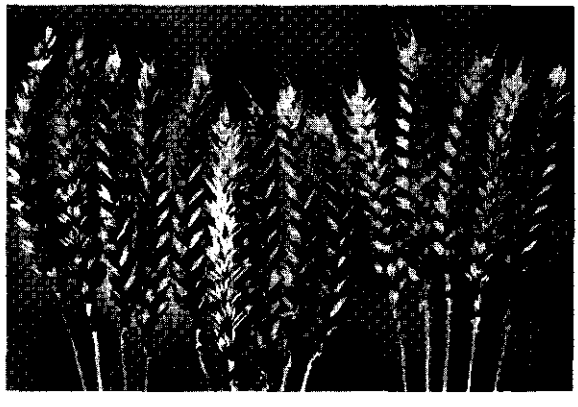


Fig. 12. Three lines of 'Duivendaal'. Left: line 'VI', centre: line 'V', and right: line 'IV'. From: Broekema (1899).

Lit.: Broekema, 1899; Mansholt, 1903; ten Rodencate, 1907; de Haan, 1936.

Comment: the red grains probably originated from cross fertilization, as the character red grain is dominant over the character white grain.

'Echeltarwe'

Grown in Cleve area. It is not the ordinary 'Kleefse tarwe'.

Synonyms: 'Hoogland', 'Rode Hoogland Kleefse'.

Comment: It is not known whether this cultivar was the same as 'Egel tarwe'.

Eenkoorn

T. monococcum. See spelt.

'Eenlandse tarwe'

The name of this wheat refers to the fact that it was grown on land that was used the previous year for another crop. The name also refers to a type of 'Zeeuwse' which yielded 36 mud/ha (c 2500 kg/ha). See further 'Braaklandse tarwe'.

Lit.: Faase, 1843; Uilkens, 1864; Meijers, 1933.

'Egel tarwe' (Hedgehog wheat)

The origin of this type is not known. It was grown as a new crop on reclaimed heath fields. In 1856 it received the first prize.

Lit.: Uilkens, 1864.

Comment: It is not known whether this cultivar was the same as 'Echeltarwe'.

'Elisabeth'

Var. *lutescens*. Selected by M.J. Dings of the Proefboerderij Hoosterhof near Roermond in 1936 from the landrace 'Gelderse Ris'. Winter hardy. Grown especially on river clay and light soils in Limburg.

Lit.: Dings, 1936; RL1942-1954; de Haan, 1957; Anon., 1955.

'Ella'

Tested at the same period as 'Algebra' en 'van Hoek'.

Comment: As there also is a cultivar named 'Ellawit', 'Ella' was probably a red-grained type.

'Ellawit' (Ella white)

Tested in the same period as 'Algebra' and 'van Hoek'.

'Emma'

Var. *albidum*. Bred by L. Broekema from the cross 'Essex Gladkaf'/'Wilhelmina' made in 1903. Possessed a better grain quality than 'Juliana', but was less winter hardy, had a low yield, and was smut-susceptible. 'Emma' was compared with 'Disponent' in 1984. 'Disponent' was chosen as it was suggested that this cultivar had a high grain protein content, which proved not to be true.

cultivar	grain yield kg/ha	1000 grain wt in g	number of grains/ha x 1000 000	%protein	protein yield kg/ha
'Emma'	5058	42.0	120.43	10.7	543.0
'Disponent'	6036	36.6	164.92	10.1	610.1

'Emma' possesses durable resistance to yellow rust (van Dijk et al., 1988).
Lit.: RL1924-1937; de Haan, 1936; Anon., 1955; van Dijk et al., 1988.

'Eng Ris (Hoey)'
Tested in the period as 'Algebra' and 'van Hoek'.

'Engelse Dikkop' (English Squarehead)
See 'Dikkop'.

'Engelse tarwe' (English wheat)
Several bread wheat cultivars were traded as 'Engelse tarwe', because sowing seed was imported from the U.K.

A vernacular name of *T. turgidum*. Another name of *T. turgidum* was Gezwollen tarwe. The term Gezwollen (inflated, turgid) refers to the short, thick ear. However, 'Engelse tarwe' may also refer to a bread wheat cultivar introduced from Great Britain. For instance Kakebeeke (1853) stated that 'Wittington' was also named 'Engelse tarwe'.

Uilkens (1864) mentioned that ca 1815 the *T. turgidum* cultivar 'Witte Hongaarse' (White Hungarian) was introduced into France and was grown around Blois. It was distributed by Batties as 'Engelse tarwe'. It produced sometimes more than 'Blanc-zee' (syn. 'Witte van Vlaanderen'). Some cultivation in Zuid-Holland.

Later 'Witte Engelse tarwe', resembling 'Essex' and 'Witte Zeeuwse', was grown. It replaced 'Australische' around 1870. In Zeeland the yield in 1850 was 44 mud/bunder (= c 3000 kg/ha). It was not winter hardy, had a red grain of good quality. Some cultivation in Zeeland and Groningen.

Lit.: Kakebeeke, 1853; van Hall, 1854; Uilkens, 1864; Anon., 1882; Troost, 1920.

'Engelse witte'
Likely identical to 'Witte Engelse Essex'. Its mean yield over the period 1852-1854 was 29.45 hl/ha, i.e. ca 2000 kg/ha.
Lit.: van der Breggen, 1856.

Erwtlandse tarwe (Pea land wheat)
Any wheat crop grown after a crop of pea.
Lit.: Wttewaal, 1834.

'Essex'

'Essex tarwe' (with glabrous glumes) has been described as a wheat similar to 'Witte Zeeuwse' and 'Engelse'. It could be grown as a winter wheat and as a spring wheat in the 19th century in the Zeeland, Zuid-Holland and Noord-Holland, where it replaced 'Zeeuwse'. The yield of a spring-sown crop was higher than that of an autumn crop after a bad winter. 'Essex' with hairy chaff was also named 'Fluweelkaf', but the common pubescent winter wheat was 'Essex Ruwkaf'. Maybe it was related to it.

Synonym: 'Fluweeltarwe'.

Lit.: Anon., 1882; Reinders, 1893; Broekema, 1899; de Haan, 1936.

Comment: This wheat probably did not possess winter hardiness.

'Essex bastaard'

Var. *albidum*. A squarehead type, bred by O. Pitsch from the cross 'Ruwkaf Essex'/'Rouge inversable' (= 'Essex fluweelkaf'/'Rouge inversable'). A successful cultivar first grown in Zeeland in 1894 from where it spread. Fairly long strong straw, white well-filled grains, good baking quality. Occasionally plants with awned ears (var. *graecum*) were observed.

Synonyms: 'Bordeaux-bastaard', 'Witte Bordeaux'.

Lit.: Mansholt, 1903; ten Rodencate, 1907; Troost, 1920; de Haan, 1936, 1957; Anon., 1955.

'Essex fluweelkaf' (Essex velvet chaff)

Var. *leucospermum*. Winter wheat. A squarehead type identical to 'White Essex', which is according to Koernicke (1885) the parental form of 'Blé blanc de Flandres' (see 'Witte van Vlaanderen'). However, 'Witte van Vlaanderen' had glabrous glumes. It may also have originated in the Netherlands from a cross between a landrace belonging to the Zeeuwse group and a squarehead type. Fairly strong straw, very susceptible to (yellow?) rust. It yielded 7 – 10 hl/ha, i.e. ca 600 kg/ha in Zeeland around 1860. This is a very low yield and adverse conditions must have caused it.

Synonyms: 'Ruwkaf Essex' and probably 'Rough Chaff'.

Lit.: Anon., 1955.

Comment: see 'Ruwkaf Essex'.

'Essex gladkaf' (Essex smooth chaff)

Var. *albidum*. A landrace originally introduced from England. A spring wheat with white, moderate long, fairly strong straw, but less lodging resistant than 'Squarehead'. Good yield and disease resistance. The ear is somewhat laxer than that of 'Essex Ruwkaf'. Fairly tolerant to frost. Sensitive for sprouting-in-the-ear. In ca 1900 the yield was ca 2000 kg/ha, which was ca 58% of 'Duivendaal'. A line of this cultivar produced 5375 kg/ha grain (which is extremely high), and 12410 kg/ha straw. This gives a harvest index of 0.30. This line possesses durable resistance to yellow rust (van Dijk et al., 1988).

Synonyms: 'Glasgow wheat', 'White Essex'.

Lit.: ter Haar, 1914; Anon., 1955; van Dijk et al., 1988.

'Essex ruwkaf' (Essex rough chaff)

A winter and spring wheat. White, moderate long, fairly strong straw, less lodging resistant and yielding than 'Squarehead', good disease resistance, susceptible for sprouting-in-the-ear. It is probably 'Ruwkaf Essex'.

Lit.: ter Haar, 1914.

'Essex tarwe' (Essex wheat)

A winter wheat introduced from England a few years before 1855. In that year no information was available yet, but 'a welcome addition'. In 1889 it was grown on the island Schouwen-Duiveland from seed M.J.L. Schram at Amsterdam, a former pupil of the then Agricultural School at Wageningen, had obtained from the collection of that school.

Lit.: Anon., 1855, 1889.

Comment: It is quite likely that some of the other 'Essex' cultivars were abridged to 'Essex tarwe'.

'Extra Kolben II'

Var. *lutescens*. A spring wheat cultivar selected by the Svalöf breeding company, Svalöv, Sweden from 'Extra Kolben I'. It had a high tillering capacity, was early ripening, had weak straw, and was affected by yellow rust and powdery mildew.

Synonym: 'Svalöfs Extra Kolben II'.

Lit.: RL1931-1938; Jonard, 1951.

'Extra Squarehead'

A winter wheat selected from either 'Rode Dikkop' or 'Leutewitz Dickkopf', or from a cross between English squarehead types. Yield data are for 1910:

Site	hl/ha	grain yield kg/ha	hl wt kg	straw yield kg/ha	harvest index
Stitswerd	59.28	4115	70.4	10000	0.29
Bleiswijk		2134		4235	0.34

Lit.: ter Haar, 1914.

'Fletumer rode' (Fletum red)

Synonym: 'Fletumer tarwe'.

'Fletumer tarwe' (Fletum wheat)

A variant, found in 1890 by J.H. Mansholt in 'Victoria' or 'Rimpau's Rode Dikkop'. It was more winter hardy than its 'source', but it produced less. It was named after the breeder's native village Fletum, situated at the Dollard,

NW. Germany and which was submerged. Some cultivation in Groningen.
Synonym: 'Fletumer rode'.
Lit.: Mansholt, 1896; Mansholt, 1903; Troost, 1920; Mansholt, 1975.

'Fluweelkaf' (Velvet chaff)
Synonyms: 'Witte Dikkop', 'Rough Chaffed Essex', 'Essex', 'Ruwkaf Essex'.
Lit.: Uilkens, 1864; Reinders, 1893; Troost, 1920; Kok, 1948.

'Fluweeltarwe' (Velvet wheat)
Synonym: 'Ruwkaf Essex'.

'Franse weit' (French wheat)
Synonym: 'Rijsweit'.
Lit.: Anon. 1826.

'Friese tarwe' (Friesian wheat)
A cultivar resembling 'Gelderse Ris' imported in Friesland before 1763; however it was less preferred, because the grains were too red and too glassy, resulting in low quality. The grains were used by distilleries. In 1830 the harvest failed and 'Zeeuwse tarwe' was introduced. After 1838 'Friese tarwe' disappeared. It was very susceptible to smut.
Synonym: 'Vriese'.
Lit.: Knoop, 1763; Uilkens, 1864; Troost, 1920; Spahr van der Hoek, 1952.

'Friese weit' (Friesian wheat)
See 'Friese tarwe'.

'Fijne witte' (Fine white)
Bred by O. Pitsch from the cross 'Zeeuwse'/'Squarehead'.
Lit.: Mansholt, 1903; Troost, 1920.

'Gebaarde ris' (Awned ris)
Grown in the Maas-en-Waal region, and with preference from seed freshly imported especially from the Cleve and Goch regions.
Synonyms: 'Angelris' (Noord-Brabant, 'Rode Pruisische' (Noord-Brabant), 'Kleefse weit' (Gelderland), 'Risweit' (Gelderland), 'Ruwarige ris'.
Lit.: Troost, 1920.

Gebaarte Weit (Awned wheat)
Knoop (1753) recognized 7 types of Gebaarte Weit: type 1. no further characterization, except that it is grown in Switzerland and France, type 2. Gebaarte Weit with (long and short) square ears grown in Engeland (possibly *T. turgidum*, ACZ), type 3. Gebaarte Weit with ears with long awns and long grains, grown in England, type 4. Gebaarte Weit with long red ears and grains, grown in the U.K., type 5. Gebaarte Weit with long, white ears, grown in Brabant, Flandres

and France (maybe awned homologues of Zeeuwse tarwe, ACZ), type 6. Gebaarte Weit with long, blueish ears, grown in Brabant, Flandres and France (maybe *T. turgidum* 'Rivet', ACZ), and type 7. Gebaarte Weit with many ears together (*T. turgidum*?, ACZ) grown by hobbyists.
Lit.: Knoop, 1753.

'Gedrongen Zeeuwse' (Compact ear from Zeeland)
Bred by O. Pitsch from the cross 'Zeeuwse'/'Squarehead'.
Lit.: Mansholt, 1903; Troost, 1920.

'Gekruiste Ic' (Once back-crossed Ic)
A preliminary name of 'Wilhelmina'.
Lit.: van Uven, 1922.

'Gekruiste Duivendaal' (Once back-crossed Duivendaal)
Bred by L. Broekema from the cross 'Duivendaal'/'Squarehead'. Fig. 13.
Lit.: Broekema, 1899.

Fig. 13. 'Gekruiste Duivendaal'. Coll. Dept. of Plant Breeding- IvP, Agric. Univ. Wageningen. Drawing made fot the 4th edition of Reinders (1893).

Fig. 14. Gekruiste Spijk'. Coll. Dept. of Plant Breeding-IvP, Agric. Univ. Wageningen. Drawing made for the 4th edition of Reinders (1893).

'Gekruiste Fletumer' (Once back-crossed Fletumer)

Bred by R.J. Mansholt from a cross 'Squarehead'/'Fletumer' (or reciprocal) made probably in 1892.

Lit.: Mansholt, 1975.

'Gekruiste Japhet zomertarwe' (Once back-crossed Japhet spring wheat)

Bred by R.J. Mansholt from a cross with 'Japhet' as one parent and an unknown cultivar as the other.

Lit.: RL1925-1926; de Haan, 1936.

'Gekruiste Spijk' (Once back-crossed Spijk)

'Gekruiste Spijk' (Fig. 14) derives from the cross 'Spijk'/'Rode Dikkop'. 'Gekruiste Spijk Ic' (Fig. 16) was the preliminary name of 'Wilhelmina'. Other lines derived from this cross were 'Gekruiste Spijk Ia', 'Gekruiste Spijk Ib' and 'Gekruiste Spijk IIg' (Fig. 15).

Lit.: Broekema, 1899.

Fig. 15. 'Gekruiste Spijk', left: line 'IIg', centre: line 'Ib', right: line 'Ia'. Coll. Dept. of Plant Breeding-IvP, Agric. Univ. Wageningen.

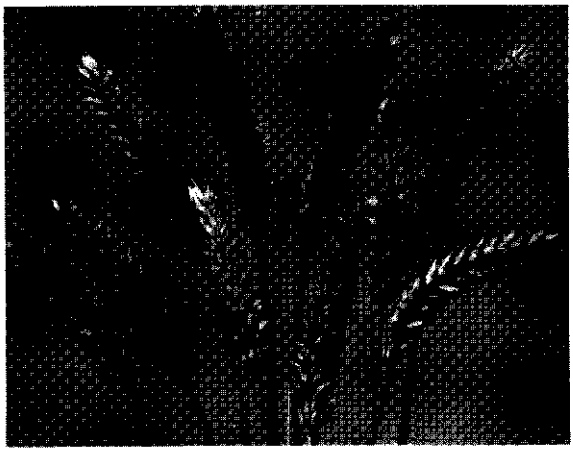


Fig. 16. 'Gekruiste Spijk Ic', syn. 'Wilhelmina'. From: Broekema (1899).

'Gekruiste Spijk Ia' (Once back-crossed Spijk Ia)
See 'Gekruiste Spijk'. Fig. 15.

'Gekruiste Spijk Ib' (Once back-crossed Spijk Ib)
See 'Gekruiste Spijk'. Fig. 15.

'Gekruiste Spijk Ic' (Once back-crossed Spijk Ic)
See 'Gekruiste Spijk'. Fig. 16. Preliminary name of 'Wilhelmina'.
Lit.: Troost, 1920.

'Gekruiste Spijk' IIg (Once back-crossed Spijk IIg)
See 'Gekruiste Spijk'. Fig. 15.

'Gelderse' (from Gelderland)
Synonym: 'Gelderse Ris'.
Lit.: ten Rodencate, 1907.

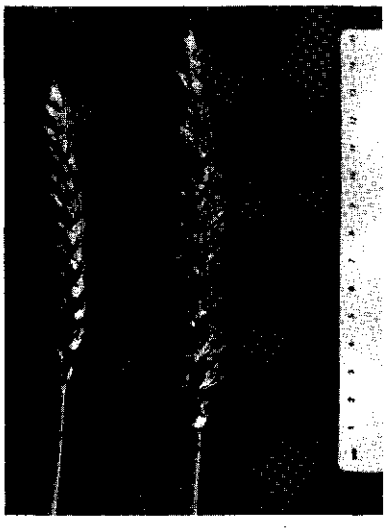
'Gelderse Ris' (Ris from Gelderland)

A landrace grown in Gelderland in the 19th century (Fig. 17). The origin of this landrace lies in the area of Geldern, Cleve, and Goch in W. Germany. From this area it reached Gelderland where it was grown on a large scale and from where it spread over the Netherlands. Its parent is 'Kleefse', and hence it is related to 'Limburgse Kleine Rode'. In other regions it received other names, see Gelderse landrace group.

Zeven (1986) pointed out that this cultivar originally came from East Europe (Fig. 18). Its migratory route to the Cleve-Goch area is not known.

Owing to its good name other red-grained cultivars may have been traded as 'Gelderse Ris'.

Originally this cultivar existed of plants with awnless, brown ears, glabrous chaff and red grains (var. *milturum*) and awnless, white ears, glabrous chaff and red grains (var. *lutescens*).



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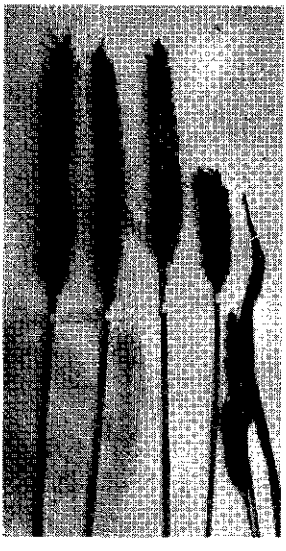

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Fig. 17. 'Gelderse Ris'. Left: a brown ear, right: a white ear.

Fig. 18. Similar to 'Gelderse Ris'. Herbarium Van Hall (L: 908.97-1657). Grown from seeds imported from Mecklenburg, Germany, and sold on a market at Amsterdam in 1833. Van Hall wrote: *Dit is onze Risweit* (This is our Risweit), meaning that this Mecklenburg material resembled 'Gelderse Ris'.

Owing to its fast spread it may have become a dirty landrace being contaminated with landraces that it replaced. Hence, this landrace existed of plants being awned or awnless (most common type), white- or brown-eared (most common type), with pubescent or glabrous chaff, with red or yellow straw, and carrying yrGR and YrGR – the former allele conditioning resistance to the yellow rust race 66(70)E0(16) (Stubbs et al., 1984). Maybe some of the awned plants derived from landraces belonging to the Ruige Kleefse landrace group.

Good winter hardy, fairly resistant to diseases, strong straw, lodging resistant, moderate yield (20-30 hl/ha, but high hectoliter weight (80 kg), i.e. the yield was 1600-2400 kg/ha, good quality. The sales price was higher than of other wheats. In Zeeland the yield was 32.5 hl/ha i.e. 2700 kg/ha. The described yield figures correspond with those obtained in 1979-1981 at Wageningen under modern crop husbandry methods when it averaged 2480 kg/ha (Zeven, unpublished). However, one Gelderse Ris line C produced in 1983 3429 kg/ha grains and 11011 kg/ha straw, giving a harvest index was 0.24 (Zeven, unpublished). This line possessed durable resistance to yellow rust (van Dijk et al., 1988). From this (probably dirty, ACZ) landrace H.K.H.A. Mayer Gmelin selected the cultivars 'Gelderse Uitzoeking 1, 2, 6, 29, 33, 42, 43, 48, and 64'.

Synonyms: 'Gelderse', 'Gelderse rode', 'Gelderse risweit'.

Lit.: van der Trappen, 1843; Uilkens, 1864; Reinders, 1893; ten Rodencate 1907; Pitsch, 1909; ter Haar, 1914; Mayer Gmelin, 1915, 1917; Percival, 1921; Azzi, 1930; Boerendonk, 1935; Feekes, 1941; de Haan, 1948, 1949; Anon., 1955; Stubbs et al., 1984; Zeven, 1986; van Dijk et al., 1988.

'Gelderse Ris van Haren I' (Gelders Ris from Haren I)

Tested in the same period as 'Algebra' and 'van Hoek'.

'Gelderse Ris van Haren II'

As 'Gelderse Ris van Haren I'.

'Gelderse Ris van Sloot'

As 'Gelderse Ris van Haren I'.

'Gelderse Rode' (Red from Gelderland)

Synonym: 'Gelderse Ris'.

Lit.: Mayer Gmelin, 1915, 1917.

'Gelderse Uitzoeking 1' (Gelders Selection 1)

Var. *velutinum*. Winter wheat selected by H.K.H.A. Mayer Gmelin from 'Gelderse Ris'. The present accession belongs to var. *ferrugineum*. On the 'Nude' (very heavy) clay soils the yield over the period 1979-1981 averaged 2526 kg/ha (Zeven, unpublished, 1986). This line carries the gene yrGR providing resistance to the yellow rust race 66(70)E0(16) (Stubbs et al., 1982).

Lit.: Mayer Gmelin, 1917; Stubbs et al., 1984.

'Gelderse Uitzoeking 2' (Gelders Selection 2)
Winter wheat selected by H.K.H.A. Mayer Gmelin from 'Gelderse Ris'.

'Gelderse Uitzoeking 6' (Gelders Selection 6)
Var. *milturum*. Winter wheat selected by H.K.H.A. Mayer Gmelin from 'Gelderse Ris'.

'Gelderse Uitzoeking 29' (Gelders Selection 29)
Winter wheat selected by H.K.H.A. Mayer Gmelin from 'Gelderse Ris'.

'Gelderse Uitzoeking 33' (Gelders Selection 33)
Winter wheat selected by H.K.H.A. Mayer Gmelin from 'Gelderse Ris'.

'Gelderse Uitzoeking 42' (Gelders Selection 42)
Var. *lutescens*. Winter wheat selected by H.K.H.A. Mayer Gmelin from 'Gelderse Ris'. On 'Nude' (very heavy) clay soils its average yield in 1979-1981 was 2461 kg/ha (Zeven, unpublished, 1986). It carries the gene yrGR which conditions resistance to the yellow rust race 66(79(E0(16) (Stubbs et al., 1984).
Lit.: Anon., 1955; Stubbs et al., 1984.

'Gelderse Uitzoeking 43' (Gelders Selection 43)
Winter wheat selected by H.K.H.A. Mayer Gmelin from 'Gelderse Ris'.

'Gelderse Uitzoeking 48' (Gelders Selection 48)
Var. *ferrugineum*. Winter wheat selected by H.K.H.A. Mayer Gmelin from 'Gelderse Ris'. Over the period 1979-1981 on Nude clay soils its average yield was 2554 kg/ha (Zeven, unpublished, 1986). It carries yrGr which provides resistance to the yellow rust race 66(79)E0(16) (Stubbs et al., 1984).
Lit.: Anon., 1806; van Hall, 1835; Anon., 1955; Stubbs et al., 1984.

'Gelderse Uitzoeking 64' (Gelders Selection 64)
A selection of 'Gelderse Ris', made by H.K.H.A. Mayer Gmelin.

'Gele' (Yellow)
T. durum. Around 1871 'Gele' en 'Poolse' were grown on lower clay- and 'meeden' soils in Hunsingo area, Groningen.
Synonyms: 'Ruige tarwe', 'Baardtarwe'.
Lit.: Heidema & Dijkema, 1871.

'Gele Engelse' (Yellow English)
Grown around 1880 in Friesland.
Lit.: Troost, 1920.

'Gele Prolific' (Yellow Prolific)
See 'Prolific'.
Synonym: 'Witte Prolific'.

'Gele tarwe' (Yellow wheat)
'Gele tarwe' or 'Gele weit' is a name used for several landraces.
Troost (1920) indicated that Thaër referred in the beginning of the 19th century to a German winter wheat cultivar as 'Gele tarwe', Anon. (1856) described that in Gelderland 'Gele weit' was replaced by 'Rode tarwe', which was a better crop and better threshable. Uilkens (1864) recognized ordinary 'Gele wintertarwe' and ordinary 'Rode tarwe'. 'Gele' was especially cultivated on lower lying clay and 'meeden' soils in Groningen.
Nice looking plants with long, smooth, white awns and long, pubescent chaffs, the hairs yellow coloured, pale red grains.
Synonyms: 'Kleefse', 'Ruige tarwe'.
Lit.: Verslag, 1855; Heidema & Dijkema, 1871.
Comment: The type with the long chaff would probably be a form of *T. polonicum*. The 'Rode tarwe' that replaced 'Gele weit' in Gelderland could be 'Gelderse Ris'.

'Gele weit' (Yellow wheat)
See 'Gele tarwe'.

'Gelria'
Var. *albidum*. A winter wheat, derived from the cross 'Essex Bastaard'/'Gelderse Ris'.

Gemeene Somer-Weit (Ordinary spring wheat)
This type was grown in most regions.
Lit.: Knoop, 1753.

Gemeen Winter-Weit (Ordinary winter wheat)
This type was grown in almost all regions.
Lit.: Knoop, 1753.

'Generaal von Stocken'
Var. *lutescens*. A winter wheat selected from a plant found in the cultivar 'Epp' by Fr. Strube at Schlanstedt, Germany in 1906. Strong straw, good winter hardy; red glassy grains.
Synonym: 'Strube's General von Stocken'.
Lit.: RL1925-1928.

'Gezwollen tarwe' (Inflated wheat)
An awnless white grained winter type of *T. turgidum* imported from England. Strong straw with a height of 125 cm, high yield (12.1 Ned. mud/3600 Ned.

el squared = c 3300 kg/ha with hectoliter weight of 68 kg/mud. It could be sown one week earlier than other winter wheats. In 1840 empty ears were observed. A wheat of no importance. It resembles 'Witte tarwe'.

Synonym: 'Engelse tarwe'.

Lit.: van Hall, 1854; Reinders & Westerhoff, 1843; Troost, 1920.

Ghebaerde terwe (Awned wheat)

Mentioned by de Lobel (1581) as an awned type of wheat.

Synonym: Gebaarte Weit.

Lit.: de Lobel, 1581.

Ghebaerde terwe met heel dobble aren (Awned wheat with quite doubled ears)

Mentioned by Lobel (1581) as a type of wheat. Very likely a type of *T. turgidum*.

Lit.: de Lobel, 1581.

Ghemeyne terwe (Common wheat)

Mentioned by Lobel (1581) as a type of wheat. As the other type was described as 'awned', the common type was probably awnless as it still is.

Lit.: Lobel, 1581.

'Gladde Ristarwe' (Smooth Ris wheat)

Smooth refers to its glabrous chaff. Short fine straw. It required a better soil than 'Gebaarde Ris'. It was cultivated around Buren, Gelderland. At Bleiswijk, Zuid-Holland it yielded 1882 kg/ha grain and 4235 kg/ha straw. The harvest index was 0.35.

Lit.: ter Haar, 1914; Troost, 1920; Anon., 1924.

Comment: Likely a synonym of 'Gelderse Ris'.

'Gladkaf Essex'

A winter and spring wheat. A squarehead type, resembling 'Ruwkaf Essex' and 'Witte Victoria'. 'Gladkaf Essex' has laxer ears, whiter, longer and thinner grains, and lower yield than 'Ruwkaf Essex'.

Moderate winter hardy, glabrous chaff, lax ear, long white grains, low yield. Its maximum yield was 40-45 hl/ha (= ca 2800- 3000 kg/ha). Some cultivation in Zeeland, Zuid-Holland and Noord- Holland.

Synonyms: 'Smooth chaffed Essex', 'Glasgow tarwe' (in Zeeland).

Lit.: ten Rodencate, 1907; Troost, 1920.

'Glasgow tarwe'

The name 'Glasgow tarwe' was used for 'Gladkaf Essex' in Zeeland. It yielded on the average 35 hl/ha i.e. ca 2000 kg/ha.

Lit.: Gerlach, 1885; ter Haar, 1914.

'Glaswitte breedaar' (Glass white wide ear)
A winter wheat bred by O. Pitsch from the cross 'Zeeuwse/Square- head'.
Lit.: Troost, 1920.

'Goese' (from Goes area, Zeeland)
The landrace 'Zeeuwse tarwe' grown around Goes, Zeeland.

'Goldendrop'
Imported from Scotland. It belonged to the Gelderse group; its ear was a little longer and broader. 'Goldendrop' existed of white-grained var. *alborubrum*) and red-grained (var. *milturum*) subcultivars. The white-grained type was grown to some extent in Groningen, Noord-Holland and Limburg around 1880. A squarehead type with almost in each spikelet 4 white to pale brown grains. Straw hard, of moderate length. The price of the white grain was 0.75 guilder/kg higher than that of red grain, but the red-grained subcultivar yielded more. So the final yield in guilders/ha was about the same. The red type had strong straw of moderate length, long, lax ears and it was a few days later ripe. The mean yield (grain type not mentioned) was 57.5 hl/ha, i.e. ca 4000 kg/ha. The brown chaff was conditioned by one gene (Zeven, 1983).
Synonym: 'Red Goldendrop'.
Lit.: Uilkens, 1864; Jongkindt Coninck, 1882; Werner, 1885; ten Rodencate, 1907; Troost, 1920; Jonard, 1951.

'Gonio'
Var. *albidum*. A winter wheat.
Lit.: Anon., 1955.
Comment: Its name suggests relationship with 'Algebra' (same parentage, and same breeder?).

'Gortrijst'
A type of *T. dicoccum*. Sown in April/May in Groningen it gave a good yield on 'zavel' (light sandy) soil. Strong straw. Of no agricultural value.
Synonym: 'Rijst'.
Lit.: Reinders, 1893.

'Goudtarwe' (Golden wheat)
Var. *lutescens*. A winter wheat.
Synonym: 'Goudtarwe van Boong'.

'Goudtarwe van Boong'
Zie 'Goudtarwe'.

'Grenadier'
A squarehead type selected at Svalöf Breeding Company, Svalöv, Sweden from 'Shireff's Squarehead'. Winter wheat. Extremely winter hardy, long, strong

straw, grain quality somewhat better than that of 'Squarehead'. Because of its winter hardiness grown in the Northern Netherlands. See for yield figures 'Mansholt's Grenadier'.

Lit.: ter Haar, 1914; Troost, 1920.

'Griekse' (from Greece)

Tested in Zeeland about 1863.

Lit.: Boerendonk, 1935.

'Groninger (A)'

See 'Ommelander'. A winter wheat.

'Groninger (B)'

A spring wheat being resistant to yellow rust race Probus. Some characteristics of this cultivar were:

	year			
	1923	1924	1925	mean
characteristic no. culms/plant	4.13	4.82	5.50	4.62
grain weight per ear (g)	0.90	0.61	0.89	0.80
straw weight per culm (g)	1.85	1.60	2.38	1.94
grain yield per plant *	3.72	4.14	4.90	4.25
harvest index *	32.7	27.6	27.2	29.2

* not presented by the source: Raum, 1926.

Lit.: Raum, 1926; Corbaz, 1966.

Comment: Corbaz (1966) used this cultivar for his yellow rust research. Under this name it is unknown in the Netherlands. It is also not known whether Raum and Corbaz used the same cultivar. The high number of culms per plant probably indicate that these plants were grown at a low density.

'Groninger Ommelander'

See 'Ommelander'. It belongs to the Gelderse group. Low yield. Grains difficult to thresh.

Lit.: van der Trappen, 1843; ten Rodencate, 1907; Troost, 1920.

'Groningse' (from Groningen)

Van der Trappen (1843) mentioned that there were two landraces of this name. They carried other names: 'Oldambster', and 'Ommelander'. A winter wheat. The 'Oldambster' and 'Ommelander' belong to the Gelderse group of landraces.

Lit.: van der Trappen, 1843; Troost, 1920.

'Groninger Ris (Hoey)'
Probably the same as 'Gelderse Ris' or ('Groninger) Ommelander'.

'Groninger Ris van de Riet'
Probably the same as 'Gelderse Ris' or ('Groninger) Ommelander'.

Grote Spelte (big spelt)
According to Knoop (1753) another name for emmer wheat. See spelt.
Lit.: Knoop, 1753.

'Grijse Winter' (Grey Winter)
About 12 ears of a *T. turgidum* type were introduced in 1677 from Beijerlandt, Zuid-Holland into the Cape Colony (now part of South Africa). After multiplication this cultivar became known as 'Seweaar'. This name 'seven ears' probably refers to the branching habit of the ear.
Lit.: Neethling, 1932.

'Hallett'
See following cultivar.

'Hallet's genealogische rode veredelde Engelse tarwe' (Hallet's pedigree red improved English wheat)
Var. *lutescens*. Tested in Groningen in 1862 and in Noord-Holland, Zuid-Holland, Gelderland and Noord-Brabant in 1863. A good yield will be obtained on fertile soil, like that of the Haarlemmermeerpolder. Frost-killed in the severe winter of 1864 in Groningen, and badly damaged in other provinces. In the Zeeland it yielded 40 hl/ha, i.e. ca 2800 kg/ha. The grains were not pure white, and had a low baking quality.
Synonym: 'Hallet's veredelde rode Engelse tarwe'.
Lit.: Anon., 1861, 1864; Reinders, 1893; Troost, 1920 Boerendonk, 1935.

'Hallet's veredelde rode Engelse tarwe' (Hallet's improved red English wheat)
Hartog (1867) suggested to use as sowing seed only the seeds of the middle part of the ear. These would result in a good crop with an 'enormous' high yield.
Synonym: 'Hallet's genealogische rode veredelde Engelse tarwe'.
Lit.: Hartog, 1867; Vilmorin, 1880.

'Heines Kolben'
Var. *lutescens*. A spring wheat, selected in 1871 from the French landrace Saumur by F. Heine, Kloster Hadmersleben, Germany. In its turn 'Saumur' may have been derived from the landrace Talimka, obtained from Turkestan, USSR (Zeven & Zeven-Hissink, 1976).
Lit.: RL1930-1936; Jonard, 1951; Zeven & Zeven-Hissink, 1976.

'Hobb's Marygold'
A red wheat grown in England and Scotland and introduced into the Netherlands.
Lit.: Uilkens, 1964.

'van Hoek'
See 'van Hoek'.

'Holland'
The names 'Holland' and 'White Holland' were used in the USA for the cultivar Wilhelmina.
Synonym: 'Wilhelmina'.
Lit.: Clark & Bayles, 1935.

'Hooglandse' (from Hoogland)
A landrace from the Cleve area, W. Germany. It is not the ordinary 'Kleefse tarwe'.
Synonym: 'Rode Hoogland Kleefse tarwe' and may be 'Bovenlandse'.

'Hundredfold'
A winter cultivar belonging to the Zeeuwse group of landraces. Poor winter hardiness, high culm number, long, strong straw, white grained. Grown on a small scale in Friesland and Groningen around 1897.
Lit.: Broekema, 1899; ten Rodencate, 1907.

'Hybride 40'
See 'Benoist 40'.

'Hybride de Bersée'
Var. *lutescens*. A winter cultivar bred by A. Blondeau, Bersée, France from the cross 'Hybride des Alliés'/'Vilmorin 23', made in 1924.
Synonym: 'Bersée'.
Lit.: RL1937-1952; Jonard, 1951; Jonard & Simon, 1961.

'Hybride de Joncquois'
Var. *lutescens*. Bred by Desprez, Cappelle par Templeuve, France from the cross 'Vilmorin 23'/'Institut agronomique', and first describes as 'Desprez 80'. High yield, but little winter hardiness and very susceptible to yellow rust.
Synonym: 'Joncquois'.
Lit.: RL1934-1939; Jonard, 1951.

'Hylkema's tarwe I' (Hylkema's wheat I)
See 'Hylkema's Victoria'.

'Hylkema's Victoria'

A winter wheat cultivar bred by P.J. Hylkema, Mensingeweer, Friesland from the cross 'Iduna'/'Wilhelmina', made in 1912. Winter hardy, good tillering capacity, yellow rust resistant, grains yellowish, good grain and straw yield.

Lit.: RL1925-1929; de Haan, 1957.

'Ideal'

Var. *lutescens*. A winter cultivar selected in 1922 by Pajbjerg-fondens Forsogsgaard, Borkop, Denmark from 'Trifolium'.

Lit.: RL1932-1936.

'Imperiaal I'

Var. *albidum*. See 'Imperiaal IIa'. It possesses durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: van Dijk et al., 1988.

'Imperiaal Ia'

Var. *albidum*. A sister line of 'Imperiaal IIa'. It possesses durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: van Dijk et al., 1988.

'Imperiaal II'

Var. *albidum*. A sister line of 'Imperiaal IIa'. It possesses durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: van Dijk et al., 1988.

'Imperiaal IIa'

Var. *albidum*. A winter cultivar bred by the Institute of Plant Breeding (I.v.P.), Wageningen from the cross 'Premier'/'Wilhelmina', made in 1903 by O. Pitsch, and introduced in 1917. Very susceptible for sprouting-in-the-ear. It replaced 'Wilhelmina' in Zeeuws-Vlaanderen. It possessed durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: RL(1917)-1924-1950; Anon., 1923; de Haan, 1936, 1948, 1949; Larose et al., 1956; van Dijk et al., 1988.

'Imperiaal IIc'

See above. It had a low winter hardiness.

Lit.: Meijers, 1933.

'Imperial'

English spelling of 'Imperiaal'.

'Inheemse rode tarwe' (Indigenous red wheat)

Schiffer (1841) described that this cultivar and an 'Inheemse witte tarwe' were compared in Noord-Brabant around 1840 with several cultivars of that time,

like 'Whittington', 'Witte Zeeuwse', 'Angelris'. The names suggest that for this trial two landraces – probably of Noord-Brabant – were used.
Lit.: Uilkens, 1864.

'Inheemse witte tarwe' (Indigenous white wheat)
See 'Inheemse rode tarwe'.
Lit.: Uilkens, 1864.

'Invicta'
A winter cultivar selected in 1922 by Pajbjergfondens Forsogsgaard, Borkop, Denmark from 'Trifolium'.
Lit.: RL1931-1942; de Haan, 1936.

'IvP 18'
A winter wheat bred by the Institute of Plant Breeding (I.v.P.), Wageningen from the cross 'Pévèle'/'Juliana'. It was not included in the List of Recommended Varieties.

'IvP 45'
A winter wheat bred by the Institute of Plant Breeding (I.v.P.), Wageningen from the cross 'Carsten V'/'Wilhelmina'//'Ardito', a cross made in 1933. A sister line was 'Carwito 45'. It was not included in the List of Recommended Varieties.

'Jacob Cats'
Var. *albidum*. A winter cultivar bred by L. Broekema, Wageningen from the cross 'Essex Gladkaf'/'Wilhelmina', made in 1905. It surpassed 'Wilhelmina' for winter hardiness, grain quality and baking value. It possessed durable resistance to yellow rust (van Dijk et al., 1988).
Lit.: RL1925-1935; van Dijk et al., 1988.

'Japhet'
See 'Mansholt's Japhet'.

'Joncquois'
See 'Hybride de Joncquois'.

Josephs wondertarwe
A vernacular name for *T. turgidum*.
Lit.: Bruinsma, 1842.

'Jubilé'
Var. *lutescens*. A winter cultivar bred by the Station d'Amélioration de Plantes, Gembloux, Belgium from the cross 'Vilmorin 23'/'Panser III' made in 1925. Very strong straw, resistant to sprouting-in-the-ear.
Lit.: RL1938-1948; Larose et al., 1956.

'Juliana'

Var. *albidum*. Bred by L. Broekema from the cross 'Wilhelmina'/ 'Essex Gladkaf', made in 1903 and named in 1921. 'Juliana' had insufficient winter hardiness, but a high yield. It was very susceptible to smut. It possessed durable resistance to yellow rust (van Dijk et al., 1988).

Eight lines selected from this cultivar carried different yellow rust resistance genes (J. Bekius, unpublished). However, all 8 lines possessed the same gliadin pattern (Zeven, unpublished).

Synonym: 'W x EP'.

Lit.: RL(1921)-1924-1953; Anon., 1923; Meijers, 1933; Addens, 1952; van Dijk et al., 1988.

'Juvèle'

A winter cultivar bred from the cross 'Juliana'/'Pévèle'. It was not included in the List of Recommended Varieties.

'Kafbladige tarwe' (Leafy chaff wheat)

T. polonicum. Another name is 'Reuzen-rogge' (giant rye).

Lit.: Anon., 1855.

'Kale ristarwe uit Kleefsland' (Awnless Ris from Cleve region)

A high yield on good soil.

Lit.: Anon., 1860.

'Kanada tarwe' (Canada wheat).

Probably a durum wheat. Imported in 1850 via England from North America, straw length 150-180 cm, high yield, red grains, easy threshable, low baking quality. Kakebeeke (1853) tested red-grained material of this name. The culm length was 139 cm ('Zeeuwse tarwe' 125 cm). The average yield over 1846-1850 was 3314 kg/ha grain and 1691 sheaves/ha straw. The hl weight was 75.78 kg. The baking quality was low and he suggested that the flour could be used for 'military bread'. Not suitable for the Netherlands and no cultivation after 1855.

Synonyms (if a durum wheat): 'Rivetts baardtarwe', 'Ropstarwe', 'Baardtarwe'.

Lit.: Anon., 1855; Uilkens, 1864; Troost, 1920.

Klaverlandse tarwe (clover land wheat)

Any wheat cultivar grown after a crop of clover.

Lit.: Wttewaal, 1834; Anon., 1839.

'Kleefse ruwarige ristarwe' (Awned Ris from Cleve)

See 'Kleefse tarwe'.

'Kleefse tarwe' (Wheat from Cleve)

Vars. *ferrugineum*, *erythrospermum* and *erythroleucon*. A winter wheat. Fig.

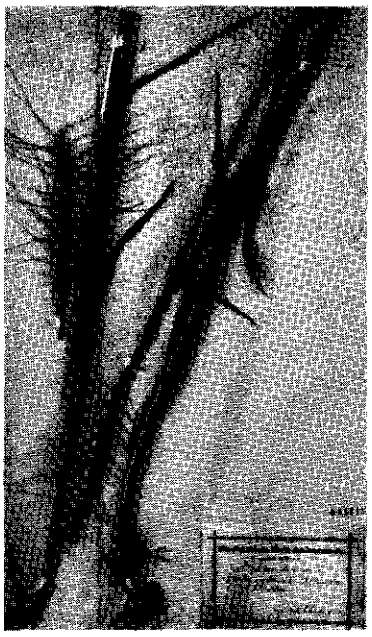

Fig. 19. Volunteer plant (probably 'Kleefse') collected in a clover field at Apeldoorn on June 26, 1877. Herbarium Kok Ankersmit (L: NBV019).

19. An awned landrace, belonging to the Ruige Kleefse landrace group, grown around Cleve and from this area introduced in neighbouring regions. In Gelderland it was known under this name or as ('awned) Risweit', in Noord-Brabant as 'Angelris' or 'Rode Pruisische'. In Groningen as Ristarwe. In this province also the awnless Kleefse was cultivated. According to Enklaar (1860) 'Kleefse tarwe' is different from 'Rode Hoogland Kleefse tarwe', but he did not elucidate this statement. 'Kleefse tarwe' produced a high yield, but during a one-day storm in the Groningen some 200 kg/ha of grains were lost.

Synonyms: 'Kleefse ruwarige ris', 'Angelris', 'Angelrist', ('awned) Gelderse Ris', 'Risweit', 'Rode Pruisische'.

Lit.: Anon., 1858; Enklaar, 1860; van Hall, 1864; Uilkens, 1864; Reinders, 1893; ten Rodencate, 1907; Troost, 1920; de Haan, 1936.

Comment: the herbarium label states that the collector identified the plant as *T. turgidum*.

'Kleefse weit'

See 'Kleefse tarwe'.

'Kleine Rode Gaelen' (Little red Gaelen)

No information.

'Kleine Rode Gooss.' (Little red Gooss.)
No information. Gooss. could be an abbreviation of the surname Goossen or Goossens.

'Kleine rode Limburg' (Little red Limburg)
See 'Limburgse kleine rode'.

'Kleine rode tarwe' (Little red wheat)
Probably a selection of a landrace. Winter hardy, long, weak straw, red grain, good baking quality. Maybe there were two cultivars under this name, because ter Haar (1914) described this cultivar as of no importance, while Azzi (1939) stated that this cultivar and 'Gelderse Risweit' could easily compete with at that time modern cultivars like 'Wilhelmina', 'Witte Dikkop', 'Millioen' and 'Imperiaal II'. During a one-day storm in Groningen in 1859 ca 200 kg/ha of grains were lost. At Bleiswijk, Zuid-Holland in 1920 it yielded 2658 kg/ha grain and 4117 kg/ha straw. The harvest index 0.39
Lit.: ter Haar, 1914; Azzi, 1930.

Kleine Spelt
According to Knoop (1753) Kleine spelt is einkorn (*T. monococcum*).
Lit.: Knoop, 1753.

'Kloosterman'
Var. *albidum*. A winter cultivar. No further information. Its name suggests that it was bred by a Mr Kloosterman.

'Koningin' (Queen)
A winter wheat cultivar mentioned by Lienesch (1934). It is not 'Wilhelmina'.
Lit.: Lienesch, 1934.

Koolstoppeltarwe (Colza stubble wheat)
Any wheat cultivar grown after a crop of colza.
Lit.: Gerlach, 1885.

'Kortarige ruwarige Essex' (small-eared pubescent Essex)
Probably a reselection of' Ruwkaf Essex'. Figs. 20 & 21. Introduced from Great Britain by Van den Bosch in 1897.
Yield data obtained by Mr. Jan van de Velde at Ierseke, Zeeland are:

Fig. 20. 'Kortarige ruwarige Essex'. From: Seed catalogue of Van den Bosch & Co. (1897).

Fig. 21. 'Kortarige ruwarige Essex'. From: Seed catalogue of Van den Bosch & Co. (1899).

year	grain yield			straw yield	harvest index
	hl/ha	hl wt	kg/ha	kg/ha	
1887	68	78	5304	7875	0.40
1888	53	75	3975	5500	0.42
1889	58	77	4466	6000	0.42
1890	57	75	4275	6075	0.41
1891	frost killed				
1892	62	78	4836	7000	0.41
mean	59.6	76.6	4571.2	6490.0	0.41

The mean yield is quite high and so is the harvest index.
Lit.: van den Bosch, 1898.
Synonym: 'Kortarige Ruwe Essex'.

'Korte Witte Dikkop' (Small White Squarehead)
A selection from 'Witte Dikkop I' or 'Witte Dikkop II' with greater lodging resistance.
Lit.: Troost, 1920; de Haan, 1957.

'Krafft's Siegerländer'

Var. *milturum*. A winter cultivar selected in ca 1900 by C. Krafft, Buer, Germany from 'Rheinische Landweizen', a landrace of Siegerland. This landrace is also named 'Siegerländer Landweizen'. Weak, long straw. Especially on sandy soils of Limburg as a baking wheat. Also grown in the Great Rivers area. Very early ripening.

Synonym: 'Siegerländer'.

Lit.: RL1926-1948; Broekema, 1938; Feekes, 1941.

'K.R.O.'

Var. *lutescens*. A winter cultivar. Lit.: Anon., 1955.

Comment: Its name could indicate its characters like K = short, little, R = red grained and O = awnless.

'Kroon'

Var. *lutescens*. A spring wheat. 'Kroon' is the Dutch name for the Swedish cultivar Kronen, which was bred by Svalöf Plant Breeding Company, at Svalöv, Sweden from the cross 'Sol'/'Pansar', made in 1914. Strong straw, moderate yield and baking quality.

Lit.: RL1926-1930; Hudson, 1934 ('Crown').

Synonym: 'Svalöf's Kroon'.

'Kruisingsangel'

Var. *graecum*. A winter cultivar, bred by H.K.H.A. Mayer Gmeling from the cross 'Gelderse Ris'/'Wilhelmina', made in 1909. It was recommended to be grown in sparrow-infested regions. It possessed durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: RL1924-1942; de Haan, 1936; Anon., 1955; van Dijk et al., 1988.

'Langarige Ruwe Essex' (long-eared pubescent Essex)

Probably a 'Ruwkaf Essex' type with a long ear. This character may have suggested a higher yield.

Lit.: Van den Bosch, 1897, 1898.

'Lange Witte Dikkop' (Long White Squarehead)

Synonyms: 'Mansholt's Lange Witte Dikkop', 'Mansholt's Witte Dikkop I', Witte Dikkop I'.

Lit.: ten Rodencate, 1907; de Haan, 1957.

'Lhennets of onbevriesbare tarwe' (Lhennets or winter hardy wheat)

Some cultivation in Zeeland, and Haarlemmermeer, Noord-Holland. Also grown on the island Schouwen-Duiveland, Zuid-Holland after 1850. It was fairly winter hardy, produced a white grain and had relatively short straw.

Lit.: Troost, 1920; Boerendonk, 1935; Boot, 1987.

Comment: The meaning of the name Lhennets is unknown to me.

'Limburger'

A landrace, probably the same as 'Limburgse Kleine Rode'. It is related to 'Gelderse Ris', 'Kleefse', 'Rode Bordeaux' and 'Goldendrop' and hence belongs to the Gelders group of landraces. Very winter hardy, very strong straw, heavy ear, good yield, good quality.

Synonyms: 'Limburgse', 'Petit Rouge'.

Lit.: Troost, 1920; Oosthoek, 1923.

'Limburgse'

Synonyms: 'Limburger', 'Limburgse Kleine Rode'.

'Limburgse Kleine Rode' (Limburg Little Red)

Var. *lutescens*. A landrace grown in Limburg and adjacent loess region in Belgium. It belongs to Gelderse group of landraces. It existed mainly of plants belonging to var. *milturum*, but occasionally plants belonging to vars. *ferrugineum*, *lutescens* and *pyrothrix* were found. Good winter hardiness, strong straw, loose grains, good grain quality, moderate yield. Mayer Gmelin (1915) selected from this landrace several lines named 'Limburgse Kleine Rode no 1', 'no 4', 'no 6' and 'no 7'.

Synonyms: 'Limburgse Rode', 'Petit Rouge'.

Lit.: ten Rodencate, 1907; Mayer Gmelin, 1915; Anon., 1955.

'Limburgse Kleine Rode no 1'

A winter cultivar selected by H.K.H.A. Mayer Gmelin from 'Limburgse Kleine Rode'. This line produced in 1983 5357 kg/ha grain and 11754 kg/ha straw, which is very high. This gives a harvest index of 0.31. It had durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: Mayer Gmelin, 1915; Anon., 1955; van Dijk et al., 1988.

'Limburgse Kleine Rode no 4'

See 'Limburgse Kleine Rode'.

'Limburgse Kleine Rode no 6'

See 'Limburgse Kleine Rode'.

'Limburgse Kleine Rode no 7'

See 'Limburgse Kleine Rode'.

'Limburgse Rode'

Synonym: 'Limburgse Kleine Rode'.

Lit.: Feekes, 1941.

'Lovink'

Var. *lutescens*. A squarehead winter cultivar selected by R.J. Mansholt, Westpolder, Groningen from the cross 'Carsten V'/ 'Juliana', made in 1932. A cultivar for 'soaked' (slempige) clay soils and sandy soils. On good clay soils it produces a low yield. Moderately winter hardy. Sensitive to sprouting-in-the-ear.

Lit.: RL1941-1957.

'Maasbommel'

Probably a landrace grown near Maasbommel, Gelderland.

'Mansholt's Dikkop I' (Mansholts Squarehead I)

Lit.: Percival, 1921.

'Mansholt's Grenadier'

Selected by R.J. Mansholt from 'Grenadier'. Winter hardy, red grained. Yield data, in comparison with 'Grenadier' are:

	hl/ha	grain yield kg/ha	hl wt kg	straw yield kg/ha	harvest index
Oldehove					
'Grenadier'	50.09	3657	73.0	6285	0.39
'Mansholt's Grenadier'	48.28	3428	71.0	6314	0.35
Stitswerd					
'Grenadier'	47.18	3345	70.9	9600	0.26
'Mansholt's Grenadier'	46.80	3706	70.6	8000	0.29
Bleiswijk					
'Grenadier'	–	2352		4352	0.35

Lit.: ten Rodencate, 1907; ter Haar, 1914.

'Mansholt's van Hoek'

See 'van Hoek'.

'Mansholt's Japhet'

Var. *lutescens*. A spring cultivar selected from ('Vilmorin's) Japhet' by R.J. Mansholt, Westpolder, Groningen. A good yield, big red grains. Susceptible to yellow rust, loose smut and fusarium. Seed desinfection was needed.

Lit.: RL1914-1929; ter Haar, 1914; ten Rodencate, 1970; Anon., 1923; de Haan, 1936.

Synonym: 'Japhet'.

'Mansholt's Gekruiste Japhet' (Mansholts once back-crossed Japhet)

A spring cultivar with stiff straw. Its ear is a bit more compact than 'Mansholt's Japhet'. Red grained and somewhat susceptible to yellow rust.

Fig. 22. 'Mansholt's Wilhelmima'. From: Seed catalogue of R.J. Mansholt, Autumn 1914.

'Mansholt's Lange Witte Dikkop' (Mansholts Long White Squarehead)
See 'Mansholt's Witte Dikkop I'.

'Mansholt's Wilhelmina'
Var. *albidum*. Fig. 22. A winter cultivar selected by R.J. Mansholt from Wilhelmina. It had a higher yield and a better frost resistance than 'Wilhelmina' itself.

Cultivar	hl/ha	grain yield kg/ha	hl wt kg	straw yield kg/ha	harvest index
Sitswerd					
'Mansholt's Wilhelmina'	57	3900	68.4	7540	0.34
'Wilhelmina'	46	3100	67.4	5960	0.34
Oldehove					
'Mansholt's Wilhelmina'	54.28	3804	70.1	8704	0.30
'Wilhelmina'	57.43	4200	72.1	6343	0.40

Lit.: ter Haar, 1914.

'Mansholt's Wilobo'
See 'Wilobo'.

'Mansholt's Witte' (Mansholts White)

Var. *albidum*. A spring cultivar bred by R.J. Mansholt, Westpolder, Groningen from the cross 'Hybride de la Paix'/ 'Blé des Alliés', made in 1921. Grown especially in Noord-Holland. It had durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: RL1931-1955; Feekes, 1941; Larose et al., 1951; de Haan, 1957; van Dijk et al., 1988.

'Mansholt's Witte III'

See 'Mansholt's Witte Dikkop III'.

'Mansholt's Witte Dikkop I' (Mansholts White Squarehead I)

Var. *albidum*. Fig. 23. A winter cultivar selected by R.J. Mansholt, Westpolder, Groningen from the cross 'Zeeuwse'/'Rode Dikkop', which was made in 1910 by L. Broekema. Long, strong straw, high yield (like 'Wilhelmina'), good grain quality. In 1895 cultivated on a large scale. In 1910 largely affected by yellow rust at Witmarsum, Friesland. However, it possessed durable resistance to yellow rust (van Dijk et al., 1988). It yielded in 1910 at Stitswerd, Friesland 54.69 hl grain/ha (hl wt 62.8 kg, 3435 kg/ha) and 9000 kg straw/ha. Harvest index 0.28.

Synonyms: 'Witte Dikkop I', 'Mansholt's Lange Witte Dikkop'.

Lit.: RL1924; ten Rodencate, 1907; ter Haar, 1914; van Dijk et al., 1988.

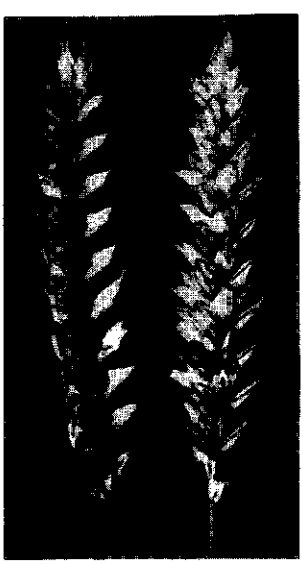

Fig. 23. 'Mansholt's Witte Dikkop I'. From Seed catalogue of R.J. Mansholt, Autumn 1914.

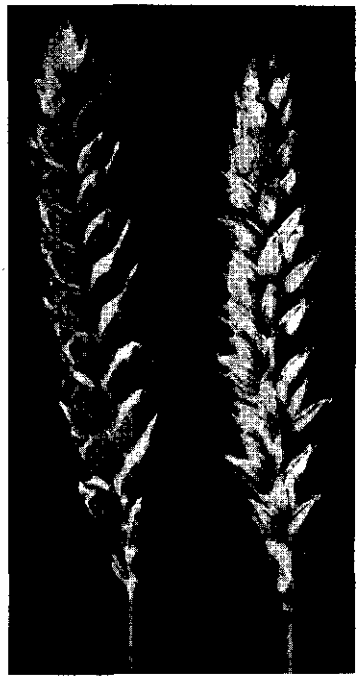

Fig. 24. 'Mansholt's Witte Dikkop II'. From Seed catalogue of R.J. Mansholt, Autumn 1914.

'Mansholt's Witte Dikkop II' (Mansholts White Squarehead II)

Var. *albidum*. Fig. 24. A winter wheat selected from the same cross as 'Mansholt's Witte Dikkop I' by R.J. Mansholt. It yielded less than 'Mansholt's Witte Dikkop III'. It yielded in 1910:

Site	hl/ha	grain yield kg/ha	hl wt kg	straw yield kg/ha	harvest index
Oldehove	47.48	3371	71.2	6057	0.36
Stitswerd	49.65	3558	71.7	7900	0.31

Lit.: ter Haar, 1914.

'Mansholt's Witte Dikkop III' (Mansholts White Squarehead III)

Var. *albidum*. A winter wheat selected by R.J. Mansholt, Westpolder, Groningen from the same cross as 'Mansholt's Witte Dikkop I'. Very winter hardy and around 1914 yellow rust resistant. Relatively short, strong straw, somewhat lower yield than 'Mansholt's Witte Dikkop I'. The yield was 50 hl/ha i.e. ca 3500 kg/ha. In 1983 this cultivar produced 4488 kg/ha grain and 11320 kg/ha straw. harvest index = 0.28. It has durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: RL(?)-1924-1934; ten Rodencate, 1907; ter Haar, 1914; Meijers, 1933; van Dijk et al, 1988.

'Marygold red'

See 'Red Marigold'.

'Matador'

Var. *alborubrum*. A squarehead winter cultivar bred by the Institute of Plant Breeding (I.v.P.), Wageningen from the cross 'Squarehead'/'Gelderse Ris'// 'Challenge' or 'Squarehead'/ 'Gelderse Ris'//'Challenge bastaard'. Good winter hardy, susceptible to yellow rust, low yield, white grains.

Synonym: 'White Matador Roodkop'.

Lit.: RL1924-1927; Anon. 1923; ter Haar, 1914; Percival, 1921; Anon., 1923; de Haan, 1957; Anon., 1955.

'Mendel'

Var. *lutescens*. Bred by Svalöf AB, Svalöv, Sweden from the cross 'Standard'/ 'Trifolium', made in 1926. Good winter hardy, but hardly recovering from frost damage. It has durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: RL1934-1955; Larose et al., 1956; Anon., 1955; van Dijk et al., 1988.

'Millioen I' (Million I)

Var. *albidum*. A winter cultivar bred by the Institute of Plant Breeding (I.v.P.), Wageningen from the cross 'Willem I'/'Wilhelmina', made in 1910. Quite long straw, but there also were lines with shorter straw. Percival (1921) indicated that 'Million' resembled 'White Monarch' (see 'Witte Monarch').

Synonym: 'Million'.

Lit.: ter Haar, 1914; Percival, 1921; Anon., 1923; Hudson, 1934.

'Millioen II' (Million II)

Var. *albidum*. A winter cultivar bred by the Institute of Plant Breeding (I.v.P.). It is a sister line of 'Millioen I'. It had a very low winter hardiness.

Lit.: Meijers, 1933.

'Millioen III' (Million III)

Var. *albidum*. A winter cultivar bred by the Institute of Plant Breeding (I.v.P.). It is a sister line of 'Millioen I'. More winter hardy, longer, but less stiff straw and more leafy than 'Wilhelmina'. This cultivar resembles 'Millioen II'. It has durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: RL1924-1927; de Haan, 1958; Anon., 1955; van Dijk et al., 1988.

'Millioen IV (Million IV)

Var. *albidum*. Probably a sister line of 'Millioen I'. It has durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: Anon., 1955; van Dijk et al., 1988

'Mold's veredelde rode' (Molds improved red)

Var. *lutescens*. A British cultivar introduced by Van den Bosch at Goes, Zeeland in 1897. See also next cultivar.

Lit.: Van den Bosch, 1897, 1900.

'Mold's veredelde witte' (Molds improved white)

Var. *albidum*. See 'Mold's veredelde rode'.

Lit.: Jongkindt Coninck, 1882.

'Monarch'

A winter cultivar introduced ca 1910 from England. It looked similar to 'Wilhelmina', but the grain and straw yield were different from 'Wilhelmina'. It is not indicated whether 'different' meant better or worse. Like 'Wilhelmina' red-grained plants were also present as an admixture. The name Monarch probably refers to Wilhelmina, Queen of the Netherlands at that time.

Synonym: 'Witte Monarch'.

Lit.: ter Haar, 1914; Troost, 1920.

'Nieuwe Angel'

Var. *albidum*. A winter cultivar bred from the cross 'Kruisingsangel'/ 'Robusta'. It has durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: van Dijk et al., 1988.

'Nieuwe Witte Tarwe' (New white wheat)

Synonym: 'Whittington'.

Lit.: Gevers Deynoot, 1843.

'Noé'

Var. *albidum* and var. *lutescens*. A spring wheat, introduced from France. White, stiff straw, lodging resistant, straw colour marine blue (blé bleu). Occasionally cultivated in the Netherlands.

Lit.: ten Rodencate, 1907.

'Noord-Hollandse' (from Noord-Holland)

A trade name of a landrace. Its name suggests that any wheat, harvested and traded in Noord-Holland, received this name.

Lit.: Uilkens, 1864.

'N.R.Y. tarwe'

Var. *lutescens*. A winter cultivar. The meaning of the initials is unknown to me.

Lit.: Anon., 1955.

'Oldambster'

A landrace grown in the Oldambt, Groningen. Belonging together with

'Ommelander' to the 'Groningse' landrace. Related to 'Gelderse Ris'. The name is also used as trade name for red-grained wheat harvested in the Oldambt. The landrace had a low baking quality.

Lit.: van der Trappen, 1843; Uilkens, 1864; Troost, 1920.

'Ommelander'

A winter wheat. A landrace grown in the Ommelanden, Groningen, and belonging together with 'Oldambster' to the 'Groningse' landrace. Related to 'Gelderse Ris'. It has a better baking quality than 'Oldambster' and hence the price is 25 to 30 cents per mud higher.

Synonym: 'Groninger'.

Lit.: van der Trappen, 1843; Geertsema, 1868; Troost, 1920; de Haan, 1936.

'Oude Rode (Hoey)' (Old Red (Hoey))

Probably a selection of 'Rode tarwe'.

'Oude Rode Ris (Hoey)' (Old Red Ris (Hoey))

Probably a selection of 'Gelderse Ris'.

'Oude Wilhelmina' (Old Wilhelmina)

Probably a selection of 'Wilhelmina'.

'Oude Zeeuwse' (Old Zeeuwse)

Resistant to wind and frost.

Lit.: Uilkens, 1864.

Synonym: 'Zeeuwse'.

'Ouwertse' (from Ouwert)

A landrace grown in Noord-Brabant.

Lit.: Uilkens, 1864.

'Overmaasse' (from Over-Maas)

A landrace grown in Over-Maas. In 1892 the price was f 7 to 9 per mud, which is f 10 to 13 per 100 kg.

Synonym: 'Over-Maasse'.

Lit.: van der Trappen, 1843; Gevers Deynoot, 1843; Anon., 1892; Boerendonk, 1935.

'Overvloed' (Plenty)

A winter cultivar selected from 'Robusta'.

'Pantser II' (Cuirass II)

Var. *lutescens*. The Swedish winter cultivar Pansar II, selected at Svalöf, Svalöv, Sweden from the cross 'Grenadier'/'Kotte'. Strong straw, frost resistant, low grain quality.

Lit.: RL1924.

'Pantser III' (Cuirass III)

Var. *lutescens*. The Swedish winter cultivar Pansar III, selected by Svalöf, Svalöv, Sweden as a sister line of 'Pantser II'. Red grained. Somewhat later than 'Wilhelmina'. Occasionally affected by yellow rust. Good yield, but from time to time shrivelled grains are produced.

Synonym: 'Svalöf's Pantser III'.

Lit.: RL1924-1927.

'Pantso'

Mentioned by Anon. (1923) as sent by the Groninger Zaaizaad-Vereeniging, Groningen and described in the Autumn 1919 Catalogue of this Association.

Lit.: Anon., 1923 (PI52526).

Comment: Probably a writing error for 'Pantser'.

'Picardie'

Var. *lutescens*. An intermediate cultivar bred Desprez Breeding Company, Cappelle, France from the cross 'Hybride des Alliés'/ 'Institut agronomique', made in 1923.

Lit.: RL1940-1942; Larose et al., 1956; Jonard & Simon, 1961.

'Poedel'

See 'Pudel'.

'Poolse tarwe' (Polish wheat)

Poolse tarwe is either *T. polonicum* or a bread wheat landrace or a group of bread wheat landraces probably introduced from Poland. Concerning the latter there are several reports about 'Poolse tarwe' which are published in the period around 1823, and in the period around 1870. The older reports describe 'Poolse tarwe' as tested at several sites in the Netherlands, but without much success. In ca 1835 it was grown at Westmaas, Zuid-Holland. Gradually the cultivar 'degraded', after which the yield had decreased with 25%. Hence it is difficult to multiply true-to-seed, and therefore it was difficult to obtain good sowing seed. Hence Rosmolen (1837) used the names 'Oude Poolse' (Old Polish) and 'Nieuwe Poolse' (New Polish). Old may refer to degraded 'Poolse', and new to recently introduced seed. Probably with the same meaning he also used 'Oude Zeeuwse' and 'Nieuwe Zeeuwse'. Moderate winter hardy and soil exhausting.

The group of bread wheat landraces from around 1870 was divided into landraces with red grains, landraces with white grains, and landraces with 'witbonte'

(white pied) grains. The latter is also named 'Bonte Poolse' (see above). The red- and white-grained landraces were preferred to the witbonte. According to ten Rodencate (1907) the red-grained landraces belong to the Gelderse group, which accords with Zeven (1986). Winter hardy, hard stiff straw, moderate yield and therefore replaced by higher yielding cultivars, such as 'Rode Dikkop' ('Squarehead'). The loss of seeds during strong winds is considerable; it was estimated to be 200 kg/ha of grains during a one-day storm in the Groningen in 1858.

Synonym: 'Poolse weit'.

Lit.: van Koetsveld, 1835; Rosmolen, 1839; van der Trappen, 1843; Anon., 1855; van Hertum, 1856; Anon., 1958, 1860; Uilkens, 1864; Heidema & Dijkema, 1871; Reinders, 1893; ten Rodencate, 1907; Troost, 1920; Zeven, 1986.

'Premier'

Var. *albidum*. Fig. 25. A winter cultivar resulting from the cross 'Challenge'/ 'Squarehead'.

Lit.: Hudson, 1934.

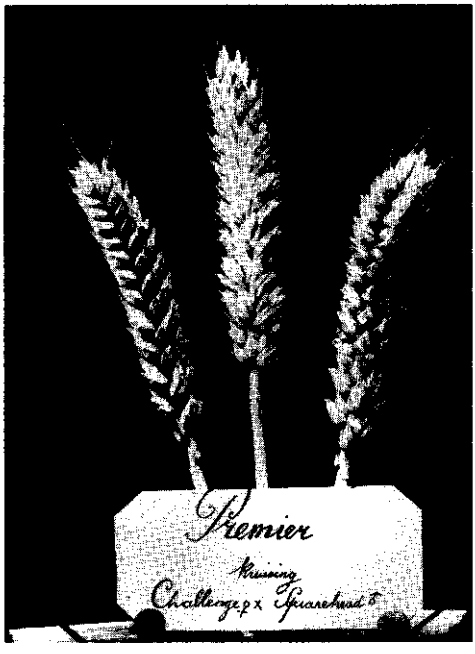

Fig. 25. 'Premier'. Coll. Dept. of Plant Breeding-IvP, Agric. Univ. Wageningen.

'Prins Hendrik'

Var. *albidum*. A winter cultivar bred by the Institute of Plant Breeding (I.v.P.), Wageningen from the cross 'Iduna'/'Millioen III', made in 1915. Suitable for sandy soils in West of Noord-Brabant. In 1983 a line produced 3441 kg grain ha and 11267 kg straw/ha. Harvest index 0.22. It possessed durable resistance to yellow rust (van Dijk et al., 1988).

Lit.: RL1933-1950; de Haan, 1936, 1937; Feekes, 1941; Anon., 1955; van Dijk et al., 1988.

'Prolific'

A winter cultivar, introduced from Scotland in 1878 and grown at first in Friesland. According to Broekema (1899) this would have been the white-grained type (see 'Rode Prolific'). The name 'Prolific' is used for red-grained and white grained cultivars ('Rode Prolific') and a white-grained cultivar ('Witte Prolific'). In Zuid-Holland 'Prolific' was also named 'Reuzentarwe' (Giant wheat), because of the long straw. Lodging resistant, gives a good yield on fertile soil.

Lit.: Broekema, 1899; Troost, 1920.

'Pruissische' (Prussian)

The name of this cultivar suggests that this landrace was introduced from Prussia, Germany.

Synonym: maybe 'Bovenlandse'.

Lit.: Engelberts, 1847.

'Queen Wilhelmina'

See 'Wilhelmina'.

Lit.: Vavilov, 1949/1950.

'Red Cross'

A red-grained cultivar sold by Van den Bosch at Goes, Zeeland in 1896. Fig. 26. Its name suggests a British origin. Each ear produced 75-100 grains, the straw length was 150-180 cm and the yield 46-55 hl/ha, i.e. ca 3500 kg/ha.

Lit.: Van den Bosch, 1901, 1906.

Comment: Van den Bosch used two different pictures of an ear to illustrate 'Red Cross', 'Royal Jubilée' and 'Veredelde Witte Monarch' apparently at random. This could mean that these cultivars resemble each other closely.

'Red Marigold

Var. *milturum*'. A red wheat, very good yields on heavy clay soils, excellent cultivar, lodging resistant, very hard, red straw and hence unsuitable as forage, grain quite loose and hence early harvesting is needed, higher yielding than 'Whittington'. (Note prepared by Geluk ca 1852 and cited in Geuse, 1950). Grown around 1850 in Groningen.

Synonyms: 'Blumenweizen', probably also 'Hobb's Marygold'.

Fig. 26. 'Red Cross'. From Seed catalogue of Van den Bosch & Co. (1900).

Lit.: Uilkens, 1864; Werner, 1885; Troost, 1920; Geuse, 1950.

'Regentes'

Var. *albidum*. A winter cultivar.

Lit.: Anon., 1955.

'Rent Payer'

A British cultivar introduced by Van den Bosch at Goes, Zeeland in 1905 and 1906.

Lit.: Van den Bosch, 1905, 1906.

'Reuzentarwe' (Giant wheat)

The name 'Reuzentarwe' was used for *T. turgidum*, which was tested to some extent in the middle of the 19th century. See also 'Reuzentarwe van St. Helena'.

Later, in Zuid-Holland, this name was also used for 'Prolific'.

Synonym: 'Syrische tarwe'.

'Reuzentarwe van St. Helena' (Giant wheat from St. Helena)

This wheat would have been introduced from Geneva, Switzerland and also from St. Helena into France. From this country it spread. Seed was obtained from Belgium and tested in the Netherlands. According to Anon. (1955) this

would have happened in 1847. However Troost (1920) reported about trials in 1834 at Sluis, Zeeland. Here 4 thimbles of sowing seed yielded 20 cups. As the conversion factors of these 'units' into modern units are not known, the propagation factor cannot be calculated.

In 1837 20 muds (2000 kg sowing seed) was available. The length of the straw was 180-195 cm and it was as strong as thatch reed. The size of the grain was twice of that of bread wheat. It was grown in some places to a small extent, but – although not reported – it disappeared from cultivation owing to 'disadvantagous characters'.

Lit.: Hall, 1854; Anon., 1855; Werner, 1885; Troost, 1920.

'Ridder' (Knight)

Var. *lutescens*. A winter cultivar bred by Svalöf Plant Breeding Company, Svalöv, Sweden from the cross 'Fylgia d'Hiver'/'Pansar II' (= Pantser II). High tillering capacity, strong straw, red grains.

Synonym: 'Svalöf's Ridder'.

Lit.: RL1924-1928.

'Ristarwe'

A winter wheat. A landrace belonging to the Gelderse group of landraces. It has red grains. It was grown in the southern part of Utrecht since ca 1795. Wttewaal (1834) stated that Risweit was red-grained and hence the seeds of *Agrostemma githago* L. and *Melampyrum arvense* L. could not easily be separated. Better winter hardy, easier threshable, and lower baking quality than white-eared wheats.

Synonym: 'Risweit'.

Lit.: Wttewaal, 1834.

Comment: A possible explanation of the term ris is given in the Introduction. As related landraces and cultivars possess one gene for the brown ear character it is assumed that the brown ear character of 'Ristarwe' is also conditioned by the same gene (Zeven, 1983).

'Risweit'

Synonyms: 'Angelris', 'Ristarwe'.

'Rivetts'

T. turgidum.

Synonyms: 'Kanadatarwe', 'Baardtarwe', 'Ropstarwe'.

Lit.: Reinders, 1893; Troost, 1920.

'Robus'

A kind of wheat.

Lit.: Lobel, 1581.

'Robusta'

Var. *albidum*. A winter cultivar, bred by H.K.H.A. Mayer Gmelin, Wageningen, from the cross 'Millioen I'/'Iduna', made in 1914. It has good winter hardiness. Low tillering capacity, strong straw. It had durable resistance to yellow rust (van Dijk et al. 1988).

Lit.: RL1929-1938; Meijers, 1933; van Dijk et al., 1988.

'Rode' (Red)

Any red-grained landrace. In 1677 the Cape Colony (South Africa) requested for seed of 'Rode'.

Around 1860 'Rode' was grown near Zwolle, Overijssel. In the Utrecht it yielded 80-85 Ned. pond/mud, i.e. one hl weighed 80-85 kg. The yield per hectare was not mentioned. In the same period 'Rode' was grown on Noord-Holland, especially after fallow or colza, as other cultivars like 'Witte', 'Gelderse', 'Zeeuwse', would be too heavy and lodge. It resembled 'Poolse', but the seed remained better in the ear.

Lit.: Anon., 1860; Uilkens, 1864; Neethling, 1932.

'Rode Australische'

A winter wheat cultivar. See 'Australische'.

Lit.: Enklaar, 1860.

'Rode Baardtarwe' (Red awned wheat)

A awned landrace grown on the clay soils of Utrecht and Gelderland. Long, fine, weak straw. At Bleiswijk, Zuid-Holland it yielded in 1910 2235 kg grain/ha and 4235 kg straw/ha, i.e. harvest index is 0.35.

Lit.: Anon., 1855; ter Haar, 1914.

'Rode Bastaard' (Red Bastard)

A winter cultivar bred by O. Pitsch from the cross 'Zeeuwse'/'Squarehead'.

Lit. Mansholt, 1903.

'Rode Bordeaux' (Red Bordeaux)

A landrace belonging to the Gelderse group of landraces. The French cultivar ('Blé) Rouge Inversable' became also known as 'Rode Bordeaux'.

Lit.: ten Rodencate, 1907.

'Rode Challenge' (Red Challenge)

Synonym: 'Challenge bastaard'.

'Rode Dikkop' (Red Squarehead).

Var. *lutescens*. Fig. 27. Found by possible a Mr Taylor in Scotland in 1865. He propagated the plant and since 1869 it was multiplied by Samuel Dickinson Shirreff. Introduced in the Netherlands in 1874. Mostly grown as a winter wheat, but occasionally as a spring wheat. Moderate winter hardy, low number of culms

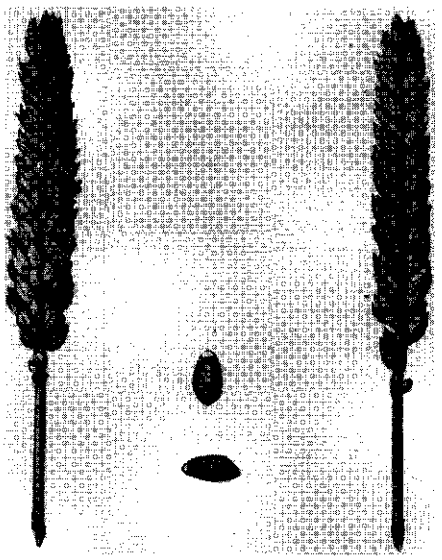

Fig. 27. 'Rode Dikkop'. From Vilmorin (1880).

per plant, short, strong culms, lodging resistant, short ear with compact top part, giving the ear a 'square' appearance, hence squarehead. Red grains of varying size, moderate baking quality, yield 40-45 hl/ha (= 3200-3500 kg/ha). J.H. Mansholt in Groningen obtained ca 1890 a yield of 4500 kg/ha, which is quite high. It replaced 'Poolse tarwe'in the north of the Netherlands and also and then especially 'Prolific' in Friesland. Another yield figure for Noord-Holland is 57.5 hl/ha, i.e. ca 4000 kg/ha. In 1983 a line at Wageningen yielded 4824 kg grain/ha and 10176 kg straw/ha. Harvest index 0.32.

A quite important cultivar and much used as breeding parent.

Synonyms: 'Dikkop', 'Squarehead', 'Rode Squarehead'.

Lit.: Jongkindt Coninck, 1882; Reinders, 1893; Mansholt, 1896; ten Rodencate, 1907; ter Haar, 1914; Percival, 1921; Troost, 1920; de Haan, 1936; Zeven, 1986.

Comment: Its Ne2ms allele indicates an East European origin (Zeven, 1986).

'Rode Engelse tarwe' (Red English wheat)

Imported from the U.K. into Groningen in 1849 by the Provinciale Commissie van Landbouw, and in 1850 by the Nederlandsche Maatschappij ter Bevordering van Nijverheid. A few days earlier than the landraces grown at that time. On mediocre clay soil it yielded 51.4 mud of 73 kg/mud and 2.14 mud of 59 kg/mud. Together this is 3878 kg/ha. In addition 920 thatching sheaves were obtained. Long straw. Elsewhere the yield was about 40 mud/ha (ca 2800 kg/ha).

Lit.: Anon., 1852; Uilkens, 1864.

'Rode gebaarde Kleefse' (Red awned from Cleve)
A winter cultivar, winter hardy, no lodging resistance, awned, red glabrous chaff, grain colour not given, moderate yield.
Synonym: 'Rijntarwe'.

'Rode gebaarde tarwe' (Red awned wheat)
Var. *erythroleucon*. A winter landrace.
Lit.: Anon., 1955.

'Rode Gelderse Ris' (Red Gelderse Ris)
See 'Gelderse Ris'.

'Rode Gochse tarwe' (Red wheat from Goch)
An awned landrace obtained from Cologne area, West Germany, and grown with good results in the Haarlemmermeerpolder, Noord- Holland. Probably related to 'Gelderse Ris', so belonging to the Gelderse group of landraces.
Lit.: Anon., 1860.

'Rode Hoogland Kleefse tarwe' (Red wheat from Hoogland, Cleve)
Var. *ferrugineum*. A landrace with a good baking quality. It is synonymous to 'Rode Tarwe Westland' and hence it belongs to the Ruige Kleefse group. Probably also synonymous to 'Hooglandse Rode ruwarige tarwe'.
Synonym: 'Rode Tarwe Westland' and maybe 'Bovenlandse'.
Lit.: Feekes, 1941.

'Rode kafbladige' (Red leafy chaff)
Some cultivation in Groningen.
Lit.: Anon., 1864.

'Rode Mecklenburger' (Red from Mecklenburg)
Introduced and similar to 'Gelderse Ris'.
Lit.: van Hall, 1864.

'Rode Oosterse tarwe' (Red eastern wheat)
A wheat used by the medical doctor Job Baster at Zierikzee, Zeeland in 1770.
Lit.: Boerendonk, 1935.

'Rode Prolific' (Red Prolific)
See 'Prolific'. Owing to its white grains this wheat is traded as 'White Prolific', but its name Rode refers to its brown chaffs. This character is conditioned by one gene (Zeven, 1983). It belongs to the Zeeuwse group. Long straw, low number of culms per plant, heavy ears, white grains. Some cultivation in Groningen, Friesland and Noord-Holland.
Lit.: ten Rodencate, 1907.

'Rode Pruisische' (Red Prussian)
Var. *ferrugineum*. A winter wheat, identical to ('awned) Kleefse tarwe', grown at Breesaap near Velsen, Noord-Holland.
Synonym: 'Kleefse tarwe'.
Reference: Leyden Herbarium no 908.97-1639.

'Rode Ris' (Red Ris)
See 'Gelderse Ris'.
Lit.: Anon., 1860; Anon., 1924.

'Rode ruwarige Hooglandse tarwe' (Red pubescent Hoogland wheat)
Grown at Nijmegen, Gelderland in 1859.
Lit.: Jongkindt Coninck, 1860.
Comment: Probably the same as 'Rode Hooglands Kleefse', and hence 'Kleefse'.

'Rode ruw-arige risweit' (Red awned Ris wheat)
See 'Gelderse Ris'.
Lit.: Anon., 1860.

'Rode Spijk'
Var. *lutescens*. Fig. 27. A red-grained sister line of 'Spijk'.

'Rode tarwe' (Red wheat)
Any brown-eared or red-grained landrace or cultivar could be named 'Rode tarwe'. Hence this type has several synonyms, which may actually refer to a landrace. The 'Rode tarwe' of the 19th century was awned and had white grains. For this latter character it was preferred in Utrecht, as the 'red' grains of darnel (*Lolium temulentum* L.) could be separated. The yield of 'Rode tarwe' was 16-40 mud/ha (ca 1120-2800 kg/ha). In the Oldambt, Groningen it yielded 25-27 with a mud weight of 72-78 kg (ca 2000 kg/ha), while only 1.5 mud/ha (= 115 kg/ha) sowing seed was used. This is a multiplication rate of ca 17. In the Betuwe, Gelderland it yielded 3.5 to 5 schepel (= 100 to 150 koppen/ morgen, 1 morgen = 0.8516 m^2). 4.11 – 5.87 schepel/ha = 122.55 – 183.82 kop/ha.
On the 'knik'(heavy clay) soils in Groningen it was still cultivated in 1880 in spite of 'Rode Dikkop'.
Synonyms: 'Ristarwe', 'Rosse tarwe', 'Rode Baard tarwe'.
Lit.: Anon., 1826; Wttewaal, 1834; Schiffer, 1843; Anon., 1855; Geertsema, 1868; Heidema & Dijkema, 1868; Troost, 1920.

'Rode tarwe Arnhem' (Red wheat from Arnhem, Gelderland)
Var. *lutescens*. It is identical to 'Rode tarwe Roozendaal'.
Lit.: Werner, 1885.

'Rode tarwe Haarlemermeer' (Red wheat from Haarlemmermeer, Noord-Holland)

Var. *lutescens*. It is identical to 'Rode tarwe Roozendaal'.

Lit.: Werner, 1885.

'Rode tarwe kaalarige Tiel' (Red awnless wheat from Tiel, Gelderland)

Var. *milturum*. Landrace in Gelderland. It yielded 1 hl weighing 86 kg, existing of ca 2 150 000 grains (= 1000 grain weight = 42.7 g). The grain yield was 160 g per 100 culms and the straw production was 270 g per 100 culms without grains. If the grain and straw yields are representative the harvest index was 0.37.

Lit.: Werner, 1885.

'Rode tarwe Roozendaal' (Red wheat from Roozendaal, Noord-Brabant)

Var. *lutescens*. A winter wheat, identical to 'Rode tarwe Haarlemermeer' and 'Rode tarwe Arnhem'. The hl weight was 83 kg with 2 041 800 grains (= 1000 grain weight = 40.7 g). Grain yield 235 g per 100 culms and straw yield 380 g per 100 culms without grains. If these data are representative the harvest index was 0.37.

Lit.: Werner, 1885.

'Rode tarwe ruwarige Tiel' (Red awned wheat from Tiel, Gelderland)

Var. *erythrospermum*. Landrace, identical to 'Rode Tarwe Roozendaal' en 'Rode Tarwe Haarlemermeer'. A winter cultivar useful for rich soils. 1 hl weighs 84 kg with 1957200 grains = 1000 grain weight 42.9 g). Grain yield 270 kg/unit area and straw weight 430 kg/unit area. The harvest index is 0.38.

Lit.: Werner, 1885.

'Rode Tarwe Westland' (Red wheat from Westland, Zuid-Holland)

Var. *ferrugineum*. According to Werner (1885) identical to the landrace 'Clever-Hochland'. It was grown in the Netherlands and the Rhine provinces of Germany and also in North-East Germany. It belonged to the Ruige Kleefse landrace group. High yield. 1 hl weighs 84 kg, consisting of 1 800 000 grains (1000 grain weight = 46.7 g). The grain yield is 213 g per 100 culms and the straw yield 277 g per 100 culms without grains. If these data are representative the harvest index was 0.435.

Synonyms: 'Clever Hochland Weizen', 'Rode Hoogland Kleefse'.

Lit.: Werner, 1885; Zeven, 1986.

'Rode Weit' (Red wheat)

See 'Rode tarwe'. According to Knoop (1753) 'Rode Weit' had red grains.

Lit.: Knoop, 1753.

'Rode Zeeuwse' (Red Zeeuwse)

A winter cultivar bred by O. Pitsch from the cross 'Squarehead'/ 'Zeeuwse'.

Lit.: Mansholt, 1903.

'Rode zomertarwe' (Red spring wheat)
Synonym: 'Zomer ris-weit'.

'Rode Zwitserse' (Red Swiss)
A spring wheat resembling the winter cultivar Gelderse Ris.
Lit.: Hall, 1854.

'Roi d'or' (Golden King)
A squarehead type, introduced from Belgium into Limburg.
Lit.: ter Haar, 1914.
Comment: The name of this cultivar could point to 'Wilhelmina' as its origin.

'Roodkaf (gladarige) witte' (Red chaff (glabrous) white grained)
Var. *alborubrum*. A winter wheat cultivar sold by Van den Bosch at Goes, Zeeland in 1905 and 1906.
Lit.: Van den Bosch, 1905, 1906.

'Roodstro tarwe' (Red straw wheat)
A winter cultivar imported by A. Kakebeeke Jzn. at Krabbendijke, Zeeland from England into Zeeland. From there it spread to the adjacent Noord-Brabant and Zuid-Holland. Beautiful white grain, easy to thresh, but this also resulted in seed loss during storms and harvesting. Low susceptibility to smut, lodging sensitive (Anon., 1855) or lodging resistant (Uilkens, 1864), low baking quality. Wheat specialists and farmers at that time were unfamiliar with purple culm colour and hence it was a quite conspicuous character. Yield 60.45 mud/ha = 5755 kg/ha (hl weight 95 kg). Competed successfully with Russian wheats. Another yield figure is over 1846-1850: 4404 kg/ha/year of grains and 1695 sheaves/ha/year, while the mean hl weight was 76.46 kg.
Lit.: Kakebeeke, 1853; van Hall, 1854, 1864; Anon., 1855, 1860; Uilkens, 1864.

'Rooije tarwe' (Red wheat)
Tested by Mr A. Geluk Azn in 1847, but had a lower yield than 'Zeeuwse'. In 1851 he again tested 'Rooije tarwe' which is a synonym of 'Marygold red' and 'Blumenweizen'. It had stiff straw, the grains are easily lost at time of ripening, the hl wt was 82 kg, and the baking quality was excellent.
Synonyms: 'Marygold red', 'Blumenweizen'.
Lit.: Geuze, 1950.

'Ropstarwe' (Rop's wheat)
T. durum. A durum wheat. A cultivar introduced by Mr. C.R. de Rop at Axel, Zeeland in 1861. He had received two ears from a sailor. The country of origin is not known. The yield is high, but the price of the grains is low owing to its low hl weight and low quality. Long, strong straw, resulting in a 33%

higher straw yield than that of 'Zeeuwse'. Some cultivation in Eastern Zeeuws-Vlaanderen, Zeeland.

Lit.: Anon., 1868; Troost, 1920.

'Rosse tarwe'

A synonym of 'Gelderse Ris'.

Lit.: Anon., 1855, van Hall, n.d.

Reference: van Hall, n.d. (Rijksherbarium Leyden specimen no 908.97-1682 right side specimen).

'Rosse weit'

See 'Rosse tarwe'.

'Rough-chaffed Essex'

Synonym: 'Ruwkaf Essex'.

'Rough Chaff Wheat'

A British cultivar increasing in area in the 19th century Zeeland as it yielded 4 to 6 hl per ha (= ca 350 kg/ha) more than 'Zeeuwse'. The seed was multiplied in Zeeland or imported from the U.K.

Lit.: Boerendonk, 1935.

Comment: likely the same cultivar as 'Ruwkaf Essex'.

'Rousselaere'

The winter wheat landrace 'Zeeuwse tarwe' grown around Rousselare, Belgium. It had fine, but strong straw. It was tested at Bleiswijk, Zuid-Holland in 1910: 1823 kg/ha grain, 4117 kg/ha straw. Harvest index 0.32

Lit.: ter Haar, 1914.

'Royal Jubilée'

A British winter wheat cultivar sold by Van den Bosch at Goes, Zeeland in 1903-1906. Fig. 28. Its average yield was 50 hl/ha per 77-81 kg/ha, i.e. ca 4000 kg/ha.

Lit.: Van den Bosch, 1903, 1905, 1906.

Comment: Van den Bosch used two different pictures of ears to illustrate 'Red Cross', 'Royal Jubilée' and 'Veredelde Witte Monarch' apparently at random. These three cultivars must have closely resembled each other. He also used the French equivalent for the name of the cultivar.

'Ruigarige' (Awned)

See 'Ruige tarwe'.

Lit.: van Hall, 1854.

'Ruige tarwe' (Awned wheat

'Ruige tarwe', 'Baardtarwe' or 'Ruige weit' is an awned type of 'Gelderse

Fig. 28. 'Royal Jubilée'. From: Seed catalogue of Van den Bosch & Co. (1900).

Ris', and hence it belongs to the Ruige Kleefse landrace group.

Lit.: van der Trappen, 1843; van Hall, 1835, 1864; Heidema & Dijkema, 1871.

'Russische tarwe' (Russian wheat)

A winter wheat probably introduced from Russia in 1826. In that year it was grown at Sluis, Zeeland. Later it was suggested that this cultivar was suitable for sandy soils and hence it was grown to some extent near Zevenbergen, Fijnaart en Klundert, Noord- Brabant. It was not successful and disappeared gradually. According to V. (1839) it had a 'plundering capacity'. This probably means that it exhausted the soils quickly.

Kakebeeke (1853) tested a white-grained cultivar with this name in the period 1846-1850. It was easy to thresh and had a good baking quality. The mean annual yield was 3279 kg/ha grains and 1870 sheaves/ha of straw. The hl weight was 76.0 kg.

Lit.: Anon., 1839; Kakebeeke, 1853; Troost, 1920.

'Ruwarige' (Awned)

Synonym: 'Rode Hoogland Kleefse'.

Lit.: Enklaar, 1860.

'Ruwarige Engelse' (Awned English)
It replaced 'Zeeuwse zomertarwe' (spring wheat).
Lit.: Boerendonk, 1935.

'Ruw-arige tarwe' (Awned wheat)
Grown at Kampen and Zwolle, Overijssel, on clay soils.
Lit.: Anon., 1860.

'Ruwarige ris' (Awned ris)
Synonym: 'Angelris'.
Lit.: Troost, 1920.

'Ruwarige rode' (Awned red)
At Herwijnen, Gelderland, 'Ruwarige rode' was often grown before 1924.
Lit.: Anon., 1924.

'Ruwarige Stichtse' (Awned from Utrecht)
Grown around 1860 in Gelderland.
Lit.: Uilkens, 1864.

'Ruwe ristarwe' (Awned Ris wheat)
Grown at Buren, Gelderland before 1924.
Lit.: Anon., 1924.

'Ruwkaf Essex' (Rough chaffed Essex)
Var. *leucospermum*. A winter wheat, but also grown as a transitory wheat. 'Ruwkaf Essex' was introduced from the U.K. It belonged to the Squarehead group. In 1853 the burgomaster of Flakkee, Zuid-Holland applied ear selection in material introduced in that year from the U.K. The seed was traded by van den Bosch at Goes, Zeeland, as 'Dikkop'. In 1868 more seed was introduced, which was grown as 'Witte Dikkop' in Noord-Brabant (west), Noord-Holland and Zuid-Holland in 1878. Like other wheat cultivars of English origin its winter hardiness was poor. Therefore, it could not be grown as a winter wheat in the north of the Netherlands. Ter Haar (1914) suggested that the first aftergrowth of seed introduced from Great Britain produced more than the original.

It became one of the four important cultivars of the period around 1860. (The other varieties being 'Zeeuwse', 'Rode' and 'Whittington'.)

Strong growth, moderate length, quite strong straw, somewhat lodging, the ear was a bit longer than in other squarehead cultivars white, sound grains. It yielded 40-45 hl/ha (= ca 2800-3150 kg/ha). Another yield figure is 54.3 hl/ha = 4398 kg/ha for the Wilhelmina-Polder, Zeeland. Yield component figures are 1 hl = 81 kg = 1895400 grains, 1000 grain weight 0.426 g, yield in kg/ha is 1830 kg straw and 262 kg grain, harvest index = 0.395. Due to its hairy glumes it was sensitive to sprouting-in-the ear. In 1911 the mean hl weight was 81 kg.

Some plants were awnless (var. *hostianum*) or had glabrous glumes (see 'Gladkaf Essex').

Synonyms: 'Rough Chaffed Essex', 'Blé à Duvet', 'Dikkop', 'Taunton Dean', 'Blé blanc d'Essex', 'Blé anglais de Bricquebec', Club-headed', 'Ruwarige Essex', 'Witte Tarwe Wilhelmina Polder', 'Dikkop tarwe'.

Lit.: Uilkens, 1864; Werner, 1885; Vilmorin, 1880; ten Rodencate, 1907; ter Haar, 1914; Troost, 1920.

'Rijntarwe' (Rhine wheat)

A synonym of 'Kleefse tarwe'. Awned with very fine awns, giving the plant an 'ornamental-like' appearance, long ear.

Lit.: van Hall, 1864; Uilkens, 1864; Reinders, 1893; ten Rodencate, 1907.

'Rijs spelt'

According to Knoop (1753) a spelt. See Spelt.

Synonym: 'Duitse Rys'.

Lit.: Knoop, 1753.

Comment: See the Introduction for a possible explanation of the term Rijs.

'Rijst' (Rice)

An emmer wheat. See 'Gortrijst'.

Lit.: Reinders, 1893.

Comment: See the Introduction for a possible explanation of the term rijst.

'Rijsweit'

Also known as 'Franse weit'. It was grown in the Betuwe, Gelderland.

Lit.: Anon., 1826.

Comment: See the Introduction for a possible explanation of the term Rijs.

'Saint Pierre'

An intermediate cultivar bred by Tourneur Frères, Coulommiers, France from the cross 'Hâtif inversable'/'Hybride des Alliées'.

Lit.: RL1938-1941.

'Sameltarwe'

A cultivar grown on Voorne and Putten, Zuid-Holland.

Lit.: Troost, 1920.

'Schiedamse' (From Schiedam area)

A landrace from the Schiedam area, Zuid-Holland.

Lit.: Troost, 1920.

'Schlanstedter zomertarwe'

Var. *milturum*. A spring wheat selected by W. Rimpay from the winter cultivar Bordeaux. Thin, but strong culm, lodging resistent, high yield. Like 'Bordeaux'

it carries one gene for brown ear (Zeven, 1983).

Lit.: ten Rodencate, 1907; ter Haar, 1914.

Comment: As the spring habit is dominant over winter habit, maybe the parental plant was a hybrid with 'Bordeaux'.

'Siegerländer' (from Siegerland)

See 'Krafft's Siegerländer'.

'Skandia II'

Var. *lutescens*. A winter cultivar bred by Svalöf AB, Svalöv, Sweden from the cross 'Kroon'/'Svalöv 0860', made in 1922.

Lit.: RL1940-1953.

Somer-terwe van dry oft vijf maenden (Spring wheat of three or five months)

Mentioned by de Lobel (1581) as a type of wheat.

Lit.: de Lobel, 1581.

'Spalding'

Grown to some extent in Groningen around 1860.

Lit.: Anon., 1864.

Spelt

Knoop (1753) divided spelt or dinkelkoorn into 4 types: 1. Grote spelt or Twee-Koorn (i.e. *T. dicoccum*, ACZ), 2. De kleine spelt or Een-koorn or St. Pieters-Koorn (*T. monococcum*), 3. Tarwe Spelt or Naakte Gerst or Kern Saad (probably naked barley, ACZ), and 4, Rijs Spelt or Duitse Spelt. This fourth type is spelt (*T. spelta*).

T. spelta. Especially the awned, white-chaffed type was grown in Noord-Brabant, Zuid-Holland and Limburg. In 1854 176 ha were used for spelt growing. These yielded 2210 mud in Noord-Brabant, 2218 mud in Zuid-Holland, 1396 mud in Limburg, 87 mud in Gelderland and 72 mud in Utrecht: total 5983 mud. Assuming a mud weight of some 65 kg the yield is 2210 kg/ha. In Gelderland in 1846 only ca 15 ha of spelt was grown. it produced about 420 mud. This is about 27000 kg which was sold to beer breweries. In 1914 286 ha spelt was grown in the Netherlands.

Around 1910 an awnless, red-chaffed, glabrous spelt with lax ear and red grain was collected near Wageningen. It was winter hardy and had thin, but strong straw. Heimans (1911) observed in an field of awnless spelt in the south of Limburg awned spelt plants, awned and awnless bread wheat plants, rye plants and two-rowed barley plants. This indicates that the spelt cultivar was greatly contaminated with other material.

In 1966 a farmer of the Betuwe, Gelderland, remembered that spelt was cultivated around 1930 and that the crop had been free of yellow rust. This latter accords with Zeven et al. (1968).

Lit.: van der Trappen, 1843; Engelberts, 1847; van Hall, 1864, Uilkens, 1864;

Fig. 29. 'Spijk'. Coll. Dept. of Plant Breeding, Agric. Univ. Wageningen. Drawing made for the 4th edition of Reinders (1893).

Reinders, 1893; Heimans, 1911; Anon., 1914; Mayer Gmelin, 1917; Zeven et al., 1968.

Comment: In the Leyden Herbarium the following spelt specimens are kept: Witte spelt (white spelt), (awnless) Rosse spelt (reddish spelt), Gebaarde rosse spelt from Wijk bij Duurstede (awned reddish spelt from Wijk bij Duurstede), Behaarde witte spelt (hairy white spelt), Ongebaarde witte zomerspelt van Friesland dated 1840 (awnless white spring spelt from Friesland).

'Spijk'

Var. *albidum*. Fig. 29. A winter cultivar bred by L. Broekema from the cross 'Rode Dikkop' ('Squarehead')/'Zeeuwse' made in 1886. Straw white, fairly long, quite strong; the ear is similar to that of 'Zeeuwse', but it contains red grains.

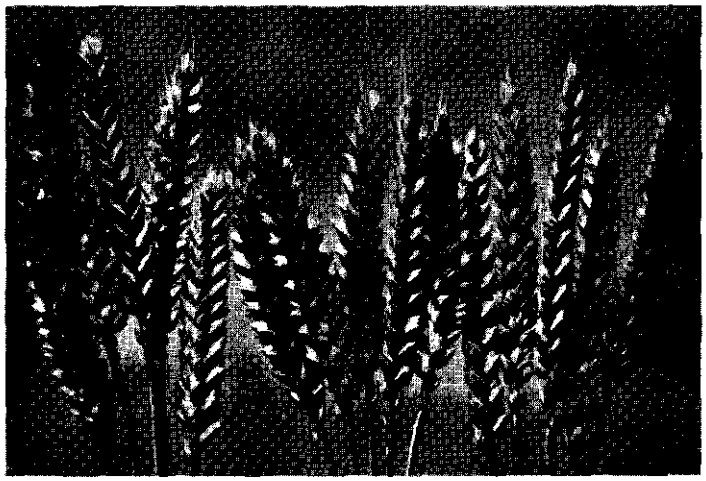

Fig. 30. 'Spijk' lines, left: 'Rode Spijk', centre: 'Spijk I', right: 'Spijk II'. From: Broekema (1899).

The yield was comparable to that of 'Zeeuwse' too. Broekema (1899) obtained a yield of 2888 kg/ha for the line Spijk II (Fig. 30), which was 88% of the yield of 'Duivendaal'. Other lines were 'Rode Spijk' and 'Spijk I' (Fig. 30). Not much grown.

Lit.: Broekema, 1899; Mansholt, 1903; ten Rodencate, 1907; ter Haar, 1914; de Haan, 1948, 1949.

'Squarehead'

See 'Rode Dikkop'.

'Staal' (Steel)

Var. *lutescens*. The Swedish winter cultivar Stal, bred by Svalöf Breeding Company, Svalöv, Sweden from the cross 'Sol II'/'Pansar I' (= Pantser I) made in 1914. Red-grained, weak long straw, baking quality better than other cultivars.

Synonym: 'Svalöf's Staal'.

Lit.: RL1927-1933.

'Standaard' (Standard)

A winter cultivar, bred by Weibull Breeding Company, Landskrona, Sweden from the cross 'Iduna'/'Tystofter Smaahvede'. Awnless, white-chaffed, red-grained, winter hardy, early ripening. A good yielder.

Lit.: RL1925-1927.

'Staring'
Var. *lutescens*. A winter cultivar, bred by Cebeco, Hoofddorp, Netherlands, from the cross 'Vilmorin 23'/'Juliana', made in 1930. It required a high N application.
Lit.: RL1942-1962; de Haan, 1957; Corbaz, 1966.

'Stichtse' (from Utrecht)
A landrace from Utrecht grown there together with 'Gelderse Ris'.
Lit.: van der Trappen, 1843; Gevers Deynoot, 1843.

St. Pieters-Koorn
T. monococcum. De Lobel (1581) described 'S.Peeterskoren' as 'the worst spelt and a better food for animals than for man.
Lit.: de Lobel, 1581; Knoop, 1753.
Comment: Probably named as such as it had to be sown on St. Petersday, i.e. 22nd of February.

'Strube's Dikkop' (Strubes Squarehead)
Var. *lutescens*. A squareheaded winter cultivar selected in 1880 by Fr. Strube, Schlanstedt, Germany from 'Squarehead'. Low winter hardiness, high yield.
Synonym: 'Strube's originele Dikkop'.
Lit.: RL1925-1927.

'Strube's General von Stocken'
See 'Generaal von Stocken'.

'Strube's originele Dikkop' (Strubes original Squarehead)
See 'Strube's Dickkopf'.

'Strubes Schlanstedter'
Var. *milturum*. A spring wheat bred by Fr. Strube, Schlanstedt, Germany. Stiff straw, red-grained, very resistant to loose smut.
Lit.: RL1925-1926.

'Svalöf's Extra Kolben II'
See 'Extra Kolben II'.

'Svalöf's Kroon'
See 'Kroon'.

'Svalöf's Pantser III'
See 'Pantser III'.

'Svalöf's Ridder'
See 'Ridder'.

'Svalöf's Staal'
See 'Staal'.

'Syrische tarwe' (Syrian wheat)
A type of *T. turgidum* grown by baron van Brakell, at Den Eng, Betuwe, Gelderland. Good quality. Very susceptible to smut. Some cultivation for private use, as the sales price was low.
Synonym: 'Reuzentarwe van Helena'.
Lit.: Beyerinck, 1853; van Hall, 1854; Anon., 1855; Troost, 1920.

'Tielerwaardse tarwe' (from Tielerwaard)
Synonym: 'Betuwse tarwe'.
Lit.: Schiffer, 1843; Uilkens, 1864.

'Torumer Rode Dikkop' (Torum Red Squarehead)
A winter cultivar, bred by D.R. Mansholt. Parentage unknown.
Lit.: Mansholt, 1975.

'Toskaanse zomertarwe' (Spring wheat from Toscania)
Advised to sow after winterkill of winter wheat.
Lit.: van Ittersum, 1847.

'Trifolium'
Var. *lutescens*. A winter cultivar, selected by the Dansk Froavls Kompagni, Trifolium, Kopenhagen, Denmark, from 'Wilhelmina', made in 1912. Very suitable for the light soils of the Veenkoloniën, Groningen and Drenthe. In 1940 'Trifolium 14', probably a reselection of 'Trifolium' was replaced by 'Trifolium Record', but the cultivar continued to be traded under the name Trifolium. 'Trifolium Record' was probably also a reselection of 'Trifolium'.
Lit.: RL1927-1948; Hudson, 1934; de Haan, 1936; Kok, 1948.

'Trifolium 14'
See 'Trifolium'.

'Trifolium XIV'
See 'Trifolium'.

'Trifolium Record'
See 'Trifolium'.

'Turkse' (Turkish)
Grown at the end of the 19th century in Zeeuws-Vlaanderen, Zeeland.

'Turkse tarwe' (Turkish wheat)
See 'Turkse'.

Comment: The vernacular name Turkse tarwe was also used for maize in the 17th and 18th centuries.

Twee-Koorn
T. dicoccum. See spelt.

'Vada'
Var. *albidum*. A winter cultivar bred by the Institute of Plant Breeding (I.v.P.), Wageningen from the cross 'Millioen I'/'Iduna'. It had a very good winter hardiness. It was not included in the List of Recommended Varieties.
Lit.: Meijers, 1933.

'van Hoek'
Var. *lutescens*. A spring wheat bred by R.J. Mansholt from the cross 'Japhet'/'Gironde', made in 1918.
Lit.: RL1925-1954; de Haan, 1936, 1957; Larose et al., 1956; Corbaz, 1966.
Synonym: 'Mansholt's van Hoek'.

Veelarige tarwe (Many-eared wheat)
A vernacular name for *T. turgidum*.
Lit.: Bruinsma, 1842.

'Verbeterde Wilhelmina' (A) (Improved Wilhelmina).
Probably later renamed 'Diekhuis'. Its characteristics are in Oldehove, Groningen 57.43 hl/ha grain, 4200 kg/ha grain, hl wt 73.1 kg, 6343 kg/ha straw, harvest index 0.40.
Lit.: ter Haar, 1914.
Synonym: 'Diekhuis'.

'Verbeterde Wilhelmina' (B) (Improved Wilhelmina)
A reselection of 'Wilhelmina' made by L. Broekema. It replaced 'Wilhelmina' and at a later date references to 'Wilhelmina' may refer either to the original 'Wilhelmina' or to the 'Verbeterde Wilhelmina'.
Synonym: 'Mansholt's Wilhelmina'.
Lit.: van den Bosch, 1906.

'Veredelde Witte Monarch' (Improved White Monarch)
Traded by Van den Bosch, Goes, Zeeland.
Lit.: van den Bosch, 1903, 1905, 1906.
Comment: Van den Bosch used two different pictures of ears (Figs. 26 and 28) to illustrate 'Red Cross', 'Royal Jubilée' and 'Veredelde Witte Monarch' apparently at random. These cultivars must have resembled each other closely.

'Victoria' (A)
Var. *albidum*. A winter cultivar resembling 'Zeeuwse', straw somewhat

shorter, ear somewhat broader, glume somewhat smaller. Also similar to 'Hallett's Veredelde'. In hot years the white glabrous glume did show pink stripes. Grain of good quality, but too loose in the ear.

Synonym: 'Hallett's Victoria'.

Lit.: Anon., 1864; Jongkindt Coninck, 1882; Reinders, 1893; Troost, 1920.

'Victoria' (B)

See 'Hylkema's Victoria'.

'Victoria d'automne'

Var. *lutescens*. A winter cultivar, introduced from the U.K. in NW France, Belgium and the Netherlands.

Synonyms: 'Blé Victoria d'automne', 'Blé Anglais', 'Kensingland'.

Lit.: Berthault & Berthault, n.d.; Vilmorin, 1880.

'Vilmorin 23'

Var. *lutescens*. A winter cultivar, bred by Vilmorin-Andrieux, Paris-Verrières, France from the cross 'Melbor'/'Grosse Tête'//'Japhet'/'Parsel'. Especially cultivated in Zeeland.

Lit.: RL1932-1936; Jonard, 1951; Jonard & Simon, 1961.

'Vilmorin 27'

Var. *lutescens*. A winter cultivar, bred by Vilmorin-Andrieux, Paris-Verrières, France from the cross 'Dattel'//'Japhet'/ 'Parsel'/3/'Hâtif inversable'/'Bon Fermier'.

Lit.: RL1934-1944; Jonard, 1951; Larose et al., 1956; Jonard & Simon, 1961.

'Vilmorin 29'

Var. *lutescens*. A winter cultivar, bred by Vilmorin-Andrieux, Paris-Verrières, France from the cross 'Vilmorin 23'/'Hybride des Alliés'.

Lit.: RL1934-1942; Jonard, 1951; Larose et al., 1956; Jonard & Simon, 1961.

'Voorjaars witte tarwe' (Spring white wheat)

Synonym: 'Whittington'. Lit.: Gevers Deynoot, 1843.

'Vriese'

A landrace. Its name probably refers to the Friesland, where it may have been grown.

'W. en W.D. 14'

Mentioned in the Autumn Catalogue 1919 of the Groninger Zaaizaadvereniging.

Lit.: Anon., 1923.

Comment: W. en W.D. probably refers to the cross 'Wilhelmina'/ 'Witte Dikkop'.

'Waard en Groet'

A winter cultivar, selected by S. Smeding, Schagen, Noord-Holland from 'Imperiaal IIa' in 1919 and maintained by the Zaaizaad-vereniging Waard en Groet, Kolhorn, Noord-Holland. Good yield, good grain, but susceptible to various diseases. White-grained.

Lit.: RL1927-1934; de Haan, 1957.

'Wageninger'

Var. *albidum*. A winter cultivar, bred by H.K.H.A. Mayer Gmelin, Wageningen from the cross 'Millioen'/'Iduna', made in 1914. Winter hardy, stiff straw, moderate tillering capacity, white grained, good yield.

Lit.: RL1926-1934; Meijers, 1933.

'Walcherse'

The landrace 'Walcherse' belonged to the landrace Zeeuwse tarwe, but was named after the island Walcheren, Zeeland because sowing seed was cleaner than 'Zeeuwse tarwe' obtained from other areas. Hence it obtained a higher price. It was comparable to 'Wittington'. It yielded ca 1838 ca 2000 sheaves/ha, i.e. 625 less than 'Wittington'. It had the same grain quality.

Lit.: V., 1839; Gerlach, 1885; Boerendonk, 1935.

'Waldeck Pyrmont'

Var. *lutescens*. A winter cultivar.

Lit.: Anon., 1955.

'Ware Squarehead' (True Squarehead)

A winter cultivar, selected by O. Pitsch, Wageningen from 'Zeeuwse'/'Squarehead'.

Lit.: Mansholt, 1903; Troost, 1920.

'Weissähriger holländischer Weizen mit gelben Korn' (White-eared Dutch wheat with yellow i.e. red grain).

Var. *villosum*. A German name for a Dutch landrace. 100 culms produced 170 g and 350 g straw. If these data are representative the harvest index is 0.33.

Lit.: Werner, 1885.

Comment: its botanical name suggests that this landrace was awnless, had hairy , white glumes and yellow i.e. red grains. Maybe it is related to 'Ruwkaf Essex'.

'Weit met langwerpige granen' (wheat with long grains)

T. polonicum. See Poolse weit.

Lit.: Knoop, 1753.

Comment: maybe Knoop, being a native German, confused the word granen (grains) with the German Grannen (awns).

'Westlandse rode ris' (Red Ris from Westland)
Probably a trade name.
Lit.: Anon., 1892.

'de Wet'
See 'de Wet'.

'White Essex'
A British landrace belonging to the landrace group Zeeuwse. It is probably identical to 'Essex fluweelkaf'. According to Werner (1885) from this landrace 'Blé blanc de Flandres' (see 'Witte van Vlaanderen') originated after it was introduced in Belgium. The straw was quite long; the ear was long and somewhat compact, the grain white.
Lit.: Uilkens, 1864; Werner, 1885.

'White Hamburg'
'White Hamburg' has been introduced into the USA from Hamburg, Germany after it was obtained from the Netherlands. It was used in the USA in 1871 as crossing parent. It was lodging resistant; had a long, coarse, broad head, a large white kernel. Clark et al. (1922) concluded their description with: Good old White Hamburg has long since been dead and buried to cultivation, at least under this name, but was largely grown on the Pacific slope during the early days of cereal culture there.
Lit.: Clark et al., 1922.

'White Holland'
Synonym: 'Wilhelmina', 'Holland'.
Lit.: Clark & Bayles, 1935.

'Whittington'
See 'Wittington'.

'Whittingtonse tarwe'
See 'Wittington'.

'Wieb'
Mentioned in Autumn Catalogue of the Groninger Zaaizaadvereeniging, 1919.
Lit.: Anon., 1923.

'Wilhelmina'
Var. *albidum*. A winter cultivar, bred by L. Broekema from the cross 'Spijk'/'Rode Dikkop' made in 1889. At first named 'Gekruiste Spijk Ic' (Fig. 16) as it was a backcross with 'Rode Dikkop' ('Squarehead') as recurrent parent. Named 'Wilhelmina' in 1901. On purpose the cultivar was composed of several

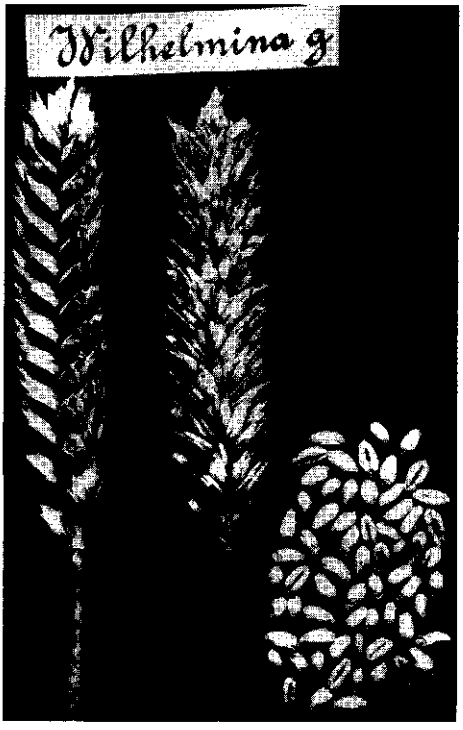

Fig. 31. 'Wilhelmina line g'. Coll. Dept. of Plant Breeding-IvP, Wageningen.

lines, as it was assumed that this would give the cultivar a good adaptability and hence the capacity to be grown in a wide variety of environments. This was done before the concept of a multiline was developed. These lines were numbered g (Fig. 31), 2, 44, 45, 49 and 312. Relative short straw, high yielding (Vavilov: one of the highest yielding West European cultivars). Mr. J. Roemeling Evers in 1902 harvested 61 hl/ha, i.e. ca 4900 kg/ha grain and 7900 hl straw. This is a harvest index of 0.38. At Bleiswijk, Zuid-Holland it yielded in 1910 3058 kg/ha grain and 5000 kg/ha straw. Harvest index also is 0.38. In 1911 the hl weight was on the average 80 kg and the average yield 60 hl/ha, i.e. a harvest of ca 4800 kg/ha. It replaced 'Dikkop' ('Squarehead') and was distributed over European countries and North America. On loess soils 'Wilhelmina' did very well. 'Wilhelmina' had a low winter hardiness.

'Wilhelmina' was inclined to degeneration, especially in the U.K. Red grains were found among the white grains. In the early part of the 20th century it was believed that these red grains derived from mutations. However, as red grain is dominant over white grain the red grains probably derived from open pollination and fertilization. It had durable resistance to yellow rust (van Dijk et al., 1988).

Hudson (1934) mentioned that the British cultivars 'The Viking' and 'Champion White' were indistinguishable from 'Wilhelmina'. This holds true for the commercial samples traded as 'Stand-Up White', while 'White Wonder' and 'Victor' are quite similar to 'Wilhelmina'.

A reselection was traded as 'Verbeterde Wilhelmina'. It probably lost its prefix and was later traded as 'Wilhelmina'.

Synonyms: 'Gekruiste Spijk Ic', 'Holland', 'White Holland', prob. 'Monarch'.

Several accessions of 'Wilhelmina' and lines derived from this cultivar were obtained from various collections (see below). One of the accession was 'Probstdeier Wilhelmina', which was not 'Wilhelmina' as it had red grains and therefore must have been a hybrid of 'Wilhelmina' and an unknown pollen parent. The same is true for CI4193 from the USDA-Small Grain Collection at Beltsville, USA. It has purple coleoptiles – a character not present in the other accessions. It also was the only accession with resistance to leaf rust race WBR80/1 (D.R. Knott, pers. comm., 1981). The other six accessions could be lines of 'Wilhelmina'. These accessions were compared with each other for several characters at Wageningen in 1984:

Accession	Grain kg/ha	Grain weight mg	Number of grains x 10000 per ha	Protein %	Protein kg/ha
Heinrich's	4406	43.2	10199	11.0	483
Mansholt's	4858	39.7	12237	11.9	576
T355-PBI	4936	37.5	13163	10.8	534
PI162595	5097	34.9	14774	10.8	553
CI9349	5017	36.5	13745	10.7	538
IvP	5125	40.0	12812	10.5	540
mean	4906	38.2	12822	11.0	540

The 'Wilhelmina' accessions differed significantly from each other ($P = 0.05$) in yield because of the low yield of 'Heinrich's Wilhelmina'. This low yield was caused by the low number of grains per ha, a character unsufficiently compensated by an increased grain weight. The low yield of 'Heinrich's Wilhelmina' also resulted in a low protein production.

The 'Wilhelmina' accessions also differed for winter hardiness, gliadin composition, phenol reaction of the grains, and seedling resistance to yellow rust race 39E134 ('Mansholt's Wilhelmina' was resistant, while the other accessions were susceptible). All six accessions had seedlings susceptible to the yellow rust races 40E8 and 108E141, to the leaf rust races N5, WBR74/3 and WBR80/1 and to the stem rust races 56, 111 and 15B (D.R. Knott, pers. comm., 1981).

Lit.: RL(1901)-1924-1948; ten Rodencate, 1907: ter Haar, 1914; Troost, 1920; Percival, 1921; Meijers, 1933; Hudson, 1934; Clarke & Bayles, 1935; Feekes, 1941; Vavilov, 1948/1919; de Haan, 1948, 1949, 1962; Addens, 1952; Corbaz, 1966; Sneep, 1966; Zeven, 1969; van Dijk et al., 1988.

Fig. 32. 'Willem I'. Coll. Dept. of Plant Breeding, Agric. Univ. Wageningen.

Comment: The mean yield of the 'Wilhelmina' accessions is 1.75 higher than that of the 'Gelderse Uitzoeking' lines selected from the landrace 'Gelderse Ris'. This could be caused by the creation of new genotypes for yield by combining genes for yield from two parental cultivars 'Zeeuwse' and 'Dikkop'.

'Willem I'

Var. *albidum*. Fig. 32. A winter cultivar, bred by O. Pitsch from the cross 'Challenge'/'Squarehead', or 'Challenge Bastaard VI'/ 'Squarehead', or 'Webb's Verbeterde (Improved) Victoria'/ 'Rode Dikkop' ('Squarehead'). It was a very leafy, early lodging cultivar with a low yield.

Lit.: ten Rodencate, 1907; ter Haar, 1914; de Haan, 1936.

'Willinton'

A corruption of 'Wittington'. From newly imported seed a Mr. Geluk in Zeeland obtained around 1850 a yield of 1.45 mud/gemet, i.e. 250 kg/ha higher than that of 'Wilhelmina'.

'Wilma'

A white-grained winter cultivar, selected in 1928 by Garton Ltd. Warrington, Great Britain from 'Wilhelmina'.

Lit.: RL1938-1942.

'Wilobo'

A winter cultivar, bred by R.J. Mansholt, Westpolder, Groningen from the cross 'Wilhelmina'/'Obotriten', made in 1924. Very winter hardy, white grains.

Synonym: 'Mansholt's Wilobo'.

Lit.: RL1932-1941; de Haan, 1936, 1957.

'Witmelige' (White floury)

A winter cultivar, bred by O. Pitsch from the cross 'Zeeuwse'/ 'Squarehead'.

Lit.: Mansholt, 1903.

'Witte' (White)

See 'Mansholt's Witte'.

'Witte of Blanke' (White)

This winter wheat was grown in all provinces of the Netherlands, except Utrecht and Gelderland in the 19th century. In Noord-Holland is was quite likely 'Wittington'.

Lit.: van der Trappen, 1843; Uilkens, 1864.

'Witte Australische' (White Australian)

A white-grained cultivar, obtained from Australia, and tested without success. See also 'Australische tarwe'.

Lit.: Troost, 1920.

'Witte Bastaard' (White Bastard)

A winter cultivar, bred by O. Pitsch from the cross 'Zeeuwse'/ 'Squarehead'. Of no importance.

Lit.: Mansholt, 1903; Troost, 1920.

Witte-boonlandse tarwe (White beanland wheat)

Any wheat cultivar, grown after a crop of white beans.

Lit.: Gerlach, 1885.

'Witte Bordeaux' (White Bordeaux)

A winter cultivar, bred by O. Pitsch from the cross 'Essex Ruwkaf'/'Rode Bordeaux'. Winter hardy, good yield, long straw, lodging resistant. The ears are in general awnless, but awned plants occur.

Synonyms: 'Bordeaux Bastaard', 'Essex bastaard'.

Lit.: ter Haar, 1914; de Haan 1936, 1957.

'Witte Dikkop' (White Squarehead)

Var. *leucospermum*. A winter cultivar, but early sowing in spring was possible. D. van Weel, burgomaster of Ooltgensplaat, Zeeland, obtained sowing seed, imported from the U.K. and selected in 1856 a plant with a squarehead ear. The original material could have been 'Wittington', contaminated with a squarehead wheat like 'Essex Ruwkaf'. Its hairy glume and the origin of the material suggest such a history (Reinders, 1893), but Troost (1920) does not agree with this. De Haan (1948, 1949) suggested that this cultivar was a mixture of cultivars. The yield of 'Witte Dikkop' was quite high: 40-45 hl/ha (= 2800-3150 kg/ha). Less winter hardy, strong straw, due to its pubescent glumes sensitive to sprouting-in-the-ear. The pubescent glumes makes the chaff unsuitable for cattle fodder.

Synonyms: 'Dikkop', 'Zeemtarwe', 'Ceemtarwe', 'Fluweeltarwe', 'Wollige tarwe', 'Witte Squarehead', and wrongly 'Whittington' and 'Essex Ruwkaf'.

Lit.: Reinders, 1893; ten Rodencate, 1907; ter Haar, 1914; Troost, 1920; de Haan, 1948, 1949.

'Witte Dikkop I' (White Squarehead I)

Var. *albidum*. A winter cultivar, bred by R.J. Mansholt, Westpolder, Groningen from the cross 'Zeeuwse'/ 'Squarehead' made by L. Broekema in 1889. Moderately winter hardy, long straw, lodging sensitive, good yield, good grain quality.

From the same cross a short type was selected, which was named 'Witte Dikkop II' (see below). 'Witte Dikkop III' is a reselection of 'Witte Dikkop I' (see below). 'Witte Dikkop I' yielded at Bleiswijk, Zuid-Holland in 1910 3340 kg/ha grain, and 5294 kg/ha straw. Harvest index 0.35.

Synonyms: 'Mansholt's Witte Dikkop I', 'Lange Witte Dikkop'.

Lit.: Mansholt, 1903; ter Haar, 1914; Troost, 1920; de Haan, 1957.

'Witte Dikkop II' (White Squarehead II)

'Witte Dikkop I' (with long straw) and 'Witte Dikkop II' (with short straw) were selected from the same cross 'Zeeuwse'/ 'Squarehead', made by L. Broekema in 1889. Winter hardy, short straw, lodging resistant.

Synonyms: 'Korte Witte Dikkop'. At Bleiswijk, Zuid-Holland 'Witte Dikkop I' yielded in 1910 2352 kg/ha grain and 5000 kg/ha straw. Harvest index 0.32.

Lit.: ter Haar, 1914.

'Witte Dikkop III' (White Squarehead)

Var. *albidum*. A winter cultivar, selected by R.J. Mansholt from 'Witte Dikkop I' in 1910. Better winter hardy than its parent, strong straw, high straw yield, good grain quality.

Lit.: de Haan, 1957.

'Witte Engelse' (White English)

See 'Witte Engelse Essex'.

'Witte Engelse Essex' (White English Essex)
A spring wheat.
Synonym: 'Witte Engels'.
Lit.: Gerlach, 1885; van den Bosch, 1898.
Comment: A squarehead type, probably 'Engelse tarwe'.

'Witte Hooglandse' (White Hoogland)
Seed was imported from England in 1854 and tested in Groningen. It yielded 22 mud/ha, i.e. ca 1500 kg/ha. Its name may, however, suggest that it came from the highlands of Great Britain. Another cultivar Hooglandse came from Hoogland, Cleve district in W. Germany.
Lit.: van Hall, 1864.

'Witte Monarch'
A winter cultivar, selected from a cross of three 'excellently yielding British wheat varieties'. However, ter Haar (1914) suggested that 'Witte Monarch' and 'Monarch' were both 'Wilhelmina'.
Leafy plant, short, strong straw, white-grained. The hl weight was on the average 75 kg. In 1910 it yielded at Bleiswijk, Zuid- Holland 2723 kg/ha grain and 4705 kg/ha straw. Harvest index 0.37.
Synonym: 'Monarch'.
Lit.: Anon., 1858b; van den Bosch, 1906; ter Haar, 1914.

'Witte Poolse' (White Polish)
Imported from Poland. Good cultivar.
Lit.: van Hall, 1864.

'Witte Prolific' (White Prolific)
Trade name for the white-grained 'Rode Prolific'. See 'Prolific'.
Lit.: ten Rodencate, 1907.

'Witte Squarehead' (White Squarehead)
Synonym: 'Witte Dikkop'.
Lit.: ten Rodencate, 1907.

'Witte tarwe' (White wheat)
This name or its equivalent 'Witte weit' is used in a general way for any wheat cultivar producing white grains or as a synonym for cultivars like 'Zeeuwse', 'Ruwkaf Essex', 'Wittington'. A white-grained cultivar yielded in Oldambt-Westerwolde-Fivelingo, Groningen 30 mud/bunder with 70 – 75 kg/mud, i.e. ca 2600 – 2800 kg/ha. On 'zavel' (light sandy) soils near Loppersum, Groningen the yield was 35-40 mud/ha, i.e. ca 2700 kg/ha.
Although in the southern part of Utrecht the price of 'Witte tarwe' was higher than that of red-grained wheat it was not cultivated as seeds of *Agrostemma githago* L. and *Melampyrum arvense* L. could not easily be observed and were

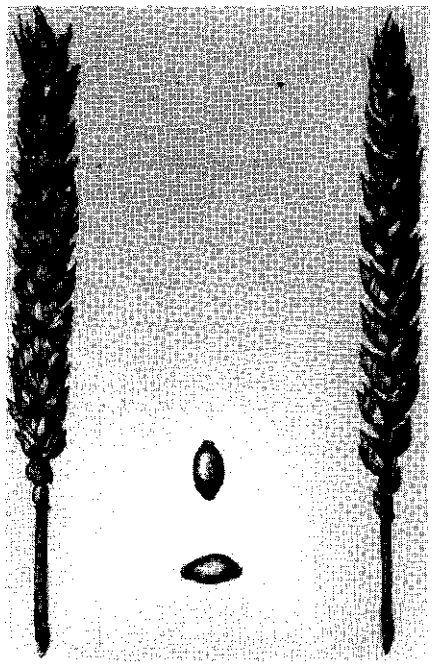

Fig. 33. 'Witte Victoria'. From: Vilmorin (1880).

difficult to remove. Instead red-grained wheat was preferred.

A 'Witte tarwe' was cultivated in Maas-en-Waal, Gelderland in 1847.

Lit.: van Hall, 1835; van Hertum, 1836; Gevers Deynoot, 1843; Schiffer, 1843; Engelberts, 1847; Uilkens, 1864; Geertsema, 1868; Heidema & Dijkema, 1868; Werner, 1885.

'Witte Victoria'

Var. *albidum*. Fig. 33. This winter cultivar belongs to the Zeeuwse group of landraces. According to Vilmorin this cultivar would have originated from the coastal regions of the Baltic states. However, ten Rodencate and ter Haar (1914) mentioned that it came from the U.K. Earlier, shorter straw, ear broader, white grains smaller and yield lower than 'Zeeuwse'. Grain quality good to excellent. According to Percival (1921) this cultivar resembles 'Witte van Vlaanderen'.

Synonym: 'Challenge' and in France: 'Victoria d'automne'.

Lit.: Vilmorin, 1880; Anon., 1889; ten Rodecate, 1907; ter Haar, 1914.

'Witte van Vlaanderen' (White Flandres)

Var. *albidum*. Fig. 34. A landrace grown – probably since long – in Flandres and equivalent or closely related to 'Zeeuwse'. It belongs to the Zeeuwse landrace group. Grown in French and Belgian Flandres. According to Werner (1885) it resembled 'White Victoria' (except for its somewhat shorter awns) and 'White

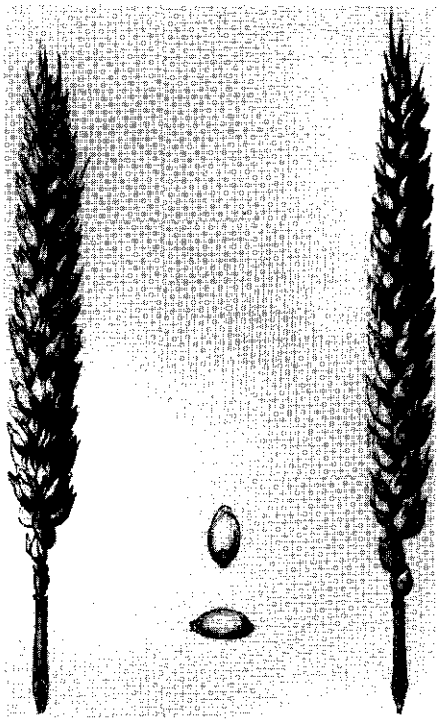

Fig. 34. 'Witte van Vlaanderen'. From: Vilmorin (1880).

Essex' (see 'Essex Gladkaf'). Grain yield 1600-1925 kg/ha straw yield 3000-5000 kg/ha, i.e. harvest index ca 0.30. Another yield figure is: 40 to 50 hl/ha, i.e. ca 2800-3500 kg/ha.

Synonym: 'Blé blanc de Flandres'.

Lit.: Uilkens, 1864; Vilmorin, 1880; Werner, 1885; Percival, 1921.

'Witte weit'

See 'Witte tarwe'. According to Knoop (1753) 'Witte weit' was named because of its white grains.

Lit.: Knoop, 1753; Anon., 1826, 1860.

'Witte Zeeuwse'

See 'Zeeuwse'.

'Witte Zeeuwse Ris'

See 'Zeeuwse'.

'Witte zomertarwe' (White spring wheat)

See 'Mansholt Witte'

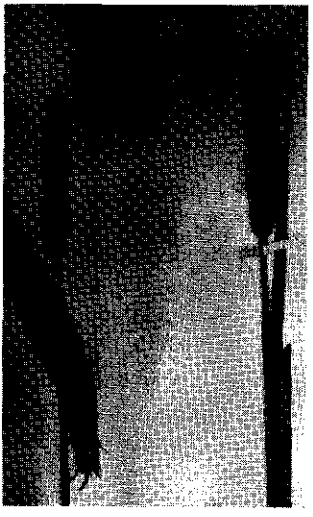

Fig. 35. 'Wittington', collected at Groningen, July 1848. On the label the correct spelling Whittington is used (L: 90.897-1384).

'Wittington'

Var. *albidum*. Fig. 35. The Dutch spelling of the cultivar name Whittington. Three ears were collected 'on a Swiss mountain' in 1830 by the Englishman Whittington of Whitmore House near Ripley and tested in the U.K. See Comment. Some trade already existed in the U.K. in 1836. It can be sown in the autumn, but also in the spring. Winter hardiness is low.

It was longer and less lodging resistant than 'Zeeuwse'. It also produced more straw. In 1839 introduced into the Netherlands where it yielded 33 mud 56 kop (3356 kg/ha) in 1840 and 27 mud 30 kop 2730 kg/ha) in 1841 (compared with 'Zeeuwse' 1840: 2952 kg/ha, 1841: 2333 kg/ha). In the same years 1675 and 1408 sheaves/ha were obtained. As spring wheat it yielded 30-31 mud/ha, i.e. ca 2150 kg/ha. Another yield figure for spring sown crop is ca 2400 kg/ha and 1564 sheaves/ha. On good soil a yield of 40-42 mud/ha, i.e. ca 2900 kg/ha. According to Reinders & Westerhoff (1843) one mud sowing seed weighed 71 kg and the yield was 12.2 mud x 69 kg/mud = 3600 kg/ha. According to Anon. (1860) the hl weight was 8-9 kg lower than that of 'Zeeuwse'.

Other yield figures are 42 mud/bunder, i.e. 2800 kg/ha, while 'Zeeuwse' produced 36-40 mud/bunder, 2500-2800 kg/ha. Over the period 1846-1850 its mean annual yield was 2851 kg/ha grains and 1715 sheaves/ha. The hl weight was 76.02 kg. From an unknown area of land 160 mud of grains and 319 mud of straw was obtained. This gives a harvest index of 0.334. The hectoliter weight was 79.6 – 81 kg, and the 1000 grain weight was 42 – 45 g.

The multiplication factor in Great Britain was 25, i.e. 12 bushels sowing seed

yielded 300 bushels. Two bushels were sufficient as sowing seed for 100 sq. m. because of the great number of ears per plant: up to 30 to 40.

Due to its good characteristics it became a desired cultivar with the greatest extension around 1850. After 1855 it declined. Kakebeeke (1853) was not enthusiastic about this cultivar because it suffered greatly from smut.

In Zeeland 70 koppen (= 70 kg) sowing seed/oude gemet (= ca 4000 sq.m. produced 1050 sheaves, which give 15 3/4 mud grains: 11 3/4 mud 1st quality and 3 1/4 mud 2nd quality and 3/4 mud chicken food. It produced ca 250 sheaves/ca 4000 sq.m. more than 'Walcherse'. So 175 kg sowing seed/ha yielded 1100 kg/ha (multiplication factor 15.75) and 625 sheaves of straw. Another yield figure is 25 mud/bunder x 70 kg/mud, i.e. 1750 kg/ha. Or 12.2 Ned. mud x 89 kg/mud 3600 kg/ha.

The straw was less suitable for forage, while seeds were lost during strong winds. The grain quality was similar to 'Walcherse'. It appeared smut susceptible. Owing to its long straw (135 cm, 'Zeeuwse tarwe' 125 cm) and heavy ear it was inclined to lodge on rich soils.

Long strong straw (c 150 cm), big ears (av. 10-12.3 cm, but up to 17.5 cm, c 21-22 spikelets/ear with 4-5, sometimes 6-7 grains/spikelet, while Zeeuwse had 10-20 spikelets/ear with 3-4, sometimes 5 grains/spikelet), white, big grains.

It was also introduced into Germany (upto West Prussia) and France where it also was much wanted.

Synonym: 'Eley's Giant'.

Lit.: Anon., 1839,1843; Reinders & Westerhoff, 1843; Faase, 1843; Kakebeeke, 1843; Gevers Deynoot, 1843; Ditmar, 1844; Schiffer, 1847; Kakebeeke, 1853; Anon., 1855, 1860; van Hall, 1864; Uilkens, 1864; Werner, 1885; Troost, 1920.

Comment: In the Leyden Herbarium one finds two specimens which may throw light on another origin of 'Wittington'. A note accompanying specimen no. 908.77-1612 (1848) says 'Zeeuwse tarwe closely resembles Wittington, but Zeeuwse tarwe always has a red auricle'. A note accompanying specimen no. 908.77-1384 says 'Wittington tarwe resembles Zeeuwse tarwe. It is var. *lutescens* i.e. a red-grained type, while Zeeuwse tarwe has white grains'. Maybe the 'Wittington' grown in the Netherlands was not derived from an introduction from Switzerland, but was selected from one of the landraces belonging to the Zeeuwse landrace group.

'Wittingtonse tarwe'

See 'Wittington'.

'Wollige Dikkop' (Woolly Squarehead)

According to Troost (1920) 'Wollige Dikkop' is a synonym of 'Witte Dikkop', but that cannot be true as 'Witte Dikkop' has smooth glumes. It probably is identical to 'Ruwkaf Essex'.

Lit.: Troost, 1920.

Wonder tarwe (Wonder wheat)
A type of *T. turgidum*.
Lit.: van der Trappen, 1843.

'X-tarwe' (X wheat)
Var. *lutescens*.
Lit.: Anon., 1955.

'IJ-tarwe' (Wheat from the IJ area)
Var. *velutinum*. A Mr. Bauduin found some beautiful ears in a field of 'Witte Dikkop'. It resembles 'Witte Engelse', which is probably 'White Squarehead'. It belongs to the Squarehead group. Spread from the IJ-polders and grown in Groningen and Friesland. Not winter hardy, strong straw.
Lit.: Anon., 1882; ten Rodencate, 1907; Troost, 1920; de Haan, 1948, 1949.

Zaadlandse tarwe
Any wheat cultivar, grown after a crop of colza.
Lit.: Wttewaal, 1834.

'Zeem-tarwe' (Shammy leather wheat)
See 'Witte Dikkop'. It is suggested that the hairy chaff resembled shammy leather, hence its name.
Synonyms: 'Witte Dikkop', 'Ceem-tarwe'.
Lit.: Troost, 1920.

'Zeeuwse' (from Zeeland)
A winter cultivar. The name 'Zeeuwse tarwe' already occurs in the Herbal of Dodonaeus, dated 1608, but it is not known whether the landrace 'Zeeuwse' of the 19th century was the same or derived from it. There also is an account of 1613 in which it is stated that at Brielle bread was only permitted te be baked from 'Zeeuwse', that was grown at Voorne. Imported 'Oosterse' (Eastern) and other bad wheats produced from the same amount of flour a bread which was 25% heavier than a bread baked from 'Zeeuwse'. The difference in weight was probably caused by a higher water content of the 'Oosterse' bread. But the public had to pay by the weight. 'Zeeuwse tarwe' was tested already in 1775 at Breesaap near Velsen, Noord-Holland.
The following account concerns the 19th century landrace.
Var. *albidum*. 'Zeeuwse' was cultivated especially in Zeeland, hence it name. In this province the total production was in ca 1843 589 750 mud (= ca 41 000 000 kg). This production must have come from some 23 000 ha. After 1830 it became widely grown in the Netherlands. For instance, it was imported in 1830 in the Friesland and in 1847 in the Groningen. In 1860 it was grown everywhere and often as the most important cultivar. This landrace and 'Gelderse' replaced the indigenous landraces. After 1875 its triumphal tour declined. In Groningen after two seasons of cultivation the landrace was contaminated

and new seed was required. This could be caused by winterkill of most lines and hence selection for landrace foreign elements. 'Zeeuwse' also became contaminated with red-grained plants in the Betuwe, Gelderland, and Utrecht. In these cases fresh sowing seed was imported.

On clayey soil it yielded ca 1700 kg/ha, with the yield components 1000 grain weight: 46.6 g and 36480687 grains/ha. The hl weight varied from 72 to 82.9 kg. The latter is quite high. The harvest index was 0.34. In Groningen a farmer needed in ca 1870 2 mud/bunder(= 140 kg/ha) for hand-sown seed and 40 to 80 kop per bunder (= 40-80 kg/ha) for machine-sown seed. The yield was 30 to 35 mud/bunder which is about 2000 to 2400 kg/ha. Another yield figure is derived from the Betuwe. Here 'Zeeuwse' yielded 3.5 to 5.5 schepel (100 to 160 kop/morgen), i.e. ca 1000-1600 kg/ha. More yield figures of Zeeland are 2952 kg/ha grains and 1540 sheaves/ha in 1840, and 2333 kg/ha grains and 1064 sheaves/ha in 1841. Another source gives 3300 kg/ha. This yield figure is exceptionally high. Kakebeeke (1853) gave as mean annual yield over the period 1846-1850 2930 kg/ha grains and 1673 sheaves/ha. The hl weight was 75.83 kg. 'Zeeuwse' was, in general, known for its low yield, hence it was replaced by cultivars as 'Wittington' and 'White Essex', and by red-grained cultivars Van der Breggen (1856) observed that over the period 1852-1854 the mean yield was 25.65 mud/ha, i.e. ca 1800 kg/ha, while 'Engelse witte' yielded some 2000 kg/ha.

Straw ca 140 cm long, white, weak and lodging sensitive. The baking quality was quite good. The 'Zeeuwse boerenbrood' (Zealand farmer's bread) was well known. In 1983, under modern growing conditions, a line of this landrace produced 5428 kg/ha grain and 11072 kg/ha straw. Harvest index is 0.33. It had durable resistance to yellow rust (van Dijk et al., 1988).

Synonyms: 'Zeeuwse Witte', 'Witte Zeeuwse', 'Witte Zeeuwse Ris'.

Lit.: Dodonaeus, 1608; Roskam Kool, 1779; Anon., 1809; Uilkens, 1819, 1847, 1864; van Hall, 1835, 1854; van Hertum, 1836; van der Trappen, 1843; Gevers Deynoot, 1843; Kakebeeke, 1853; Anon., 1855; van der Breggen, 1856; Anon., 1860; Heidema & Dijkema, 1871; Vilmorin, 1880; Anon., 1882; Werner, 1885; Anon., 1889; Reinders, 1893; van Hoevell, 1902; Troost, 1920; Oosthoek, 1923; de Haan, 1948, 1949. van Dijk et al., 1988.

Comment: Vilmorin (1880) described a 'blé de Zélande' (syn. Grano de Zelande). This cultivar is not 'Zeeuwse' as it was described as coming from the Mediterranean region. However, the pictured ear resembles that of 'Zeeuwse'. Vilmorin must have been confused and hence Berthauld & Berthauld were mistaken.

'Zeeuws-Vlaamse tarwe'

A landrace belonging to the Zeeuwse group which was grown in Zeeuws-Vlaanderen, Zeeland. It was, at the end of the 18th century, less appreciated than 'Zeeuwse tarwe' because of its lower quality.

Lit.: Ermerins, 1793 (cited by Boerendonk, 1935).

'Zeeuwse zomertarwe' (Zeeland spring wheat)
A landrace grown in Zeeland and replaced around 1870 by 'Ruwarige Engelse tarwe', because of the latter's higher yield.
Lit.: Boerendonk, 1935.

'Zomer ris-weit' (Spring Ris-weit)
Specimen no 908.77-1672 in Leijden Herbarium.

Zomervaagse tarwe
Any wheat cultivar grown after a summer fallow.
Lit.: Wttewaal, 1834.

Zwarte-boonlandse tarwe (Black bean land wheat)
Any wheat cultivar, grown after a crop of black beans.
Lit.: Gerlach, 1885.

'Zweedse' (Swedish)
A frost sensitive cultivar, according to its name, introduced from Sweden. Grown around 1880 in the Groningen and Friesland. Thick, long, white straw, lodging sensitive, long, awnless ear, white, glabrous glumes, grain with good quality. Low yield, disease-susceptible.
Lit.: ter Haar, 1914; Troost, 1920.

'Zwitserse rode' (Swiss red)
Its name suggests that it was introduced from Switzerland. Grown in Zuid-Holland. In early summers it provided a good crop.
Lit.: Uilkens, 1864.

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