



# Proportion of Livestock Breeds and Plant Varieties

Since the second half of the 20<sup>th</sup> century a small number of livestock breeds and crop plant varieties have been prevalent in Switzerland's agriculture. However, it is not only losing individual breeds and varieties that gives cause for concern, but also curtailing the genetic basis to a few high-performance hybrid lines. The trend towards inbreeding limited the genetic range of farm animals and crop plants, thereby restricting a population's capacity to respond to parasite infestations, infectious diseases, or epidemics. This makes conservation programs for heirloom livestock breeds and plant varieties all the more valuable, since they reduce the risk of yet another breed or variety disappearing forever.

Still, conservation programs notwithstanding, productive livestock keeping and commercial growing are dominated by a mere handful of breeds and varieties. To name but two extreme examples: A good 66% of all herdbook-registered pigs are Large Whites, and roughly 63% of the area under European white vines are planted with Chasselas.

**Status: September 2015**

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Complementing the Z1 indicator which merely lists the various livestock breeds and crop plant varieties kept and cultivated in Switzerland, the Z2 indicator assesses their significance within the country's agriculture. For reasons of data availability, Z2 is limited to hooved livestock breeds (cattle, pigs, sheep, goats) and select plant species.

## Development in Switzerland

### Livestock breeds

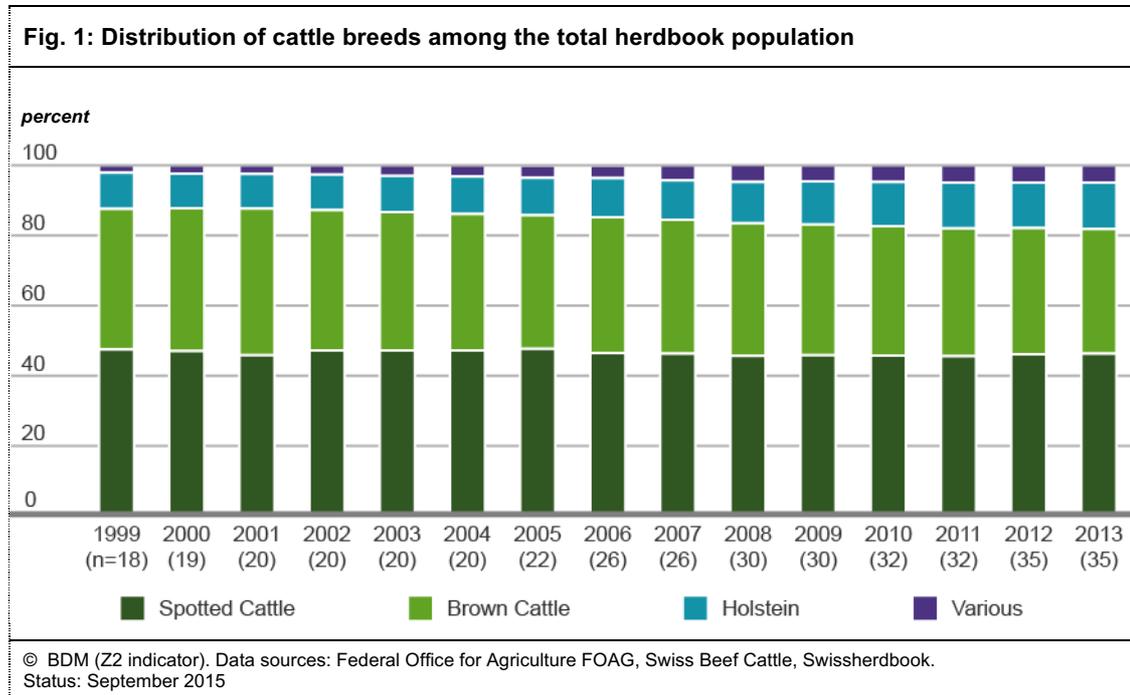
While the Z2 indicator only covers breeds registered in herdbooks kept by breeders' organizations recognized by the Federal Office for Agriculture FOAG, herdbook animals make up only a fraction of all livestock, since herdbooks only register breeding animals of a specified minimum age that have been certified to possess the typical features demanded of their breed. Moreover, it takes a certain minimum number of animals for a herdbook to be established for a breed. Animals not registered in any herdbook may be crossbreds or purebreds. It is safe to assume that the characteristic features of breeds kept in large numbers will also frequently be observed in non-herdbook animals.

There may be different specializations of breeding within a breed. Grey Cattle, for one, is predominantly bred for milk performance, but some breeders have recently started to select for beef production as well. However, animals bred to different specializations are not recorded separately by this indicator. Furthermore, it is possible for different sections to emerge within a breed. The FOAG subdivides the breed Spotted Cattle into: Spotted Cattle, Simmental, Montbéliarde, Holstein, Normande and Pinzgauer. Yet even though Montbéliarde is recognized to be a distinctive breed by the FOAG, it is not recorded separately. Brown Cattle is composed of the Original Swiss Brown, Brown Swiss sections and Grey Cattle. The transition from sections to new breeds is fluid.

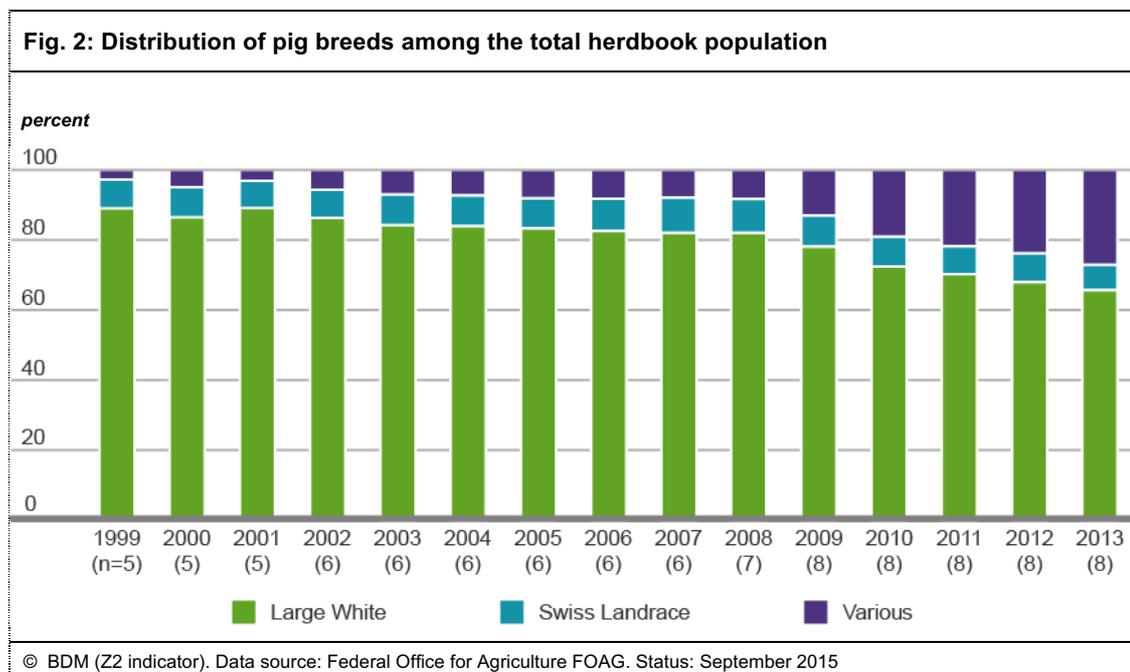
Until 1999, Switzerland's federal government only supported the breeding of official Swiss breeds (4 breeds of cattle, 2 breeds of pig, 4 breeds of sheep, 8 breeds of goat). When the new Swiss Ordinance on Livestock Breeding came into force on December 7 1998, by now it was replaced by the Swiss Ordinance on Livestock Breeding from October 31 2012 (SR 916.310), this restriction was abandoned, allowing the breeding of non-Swiss breeds to be subsidized as well. Replaced by an updated version on November 14, 2007, the new Ordinance also assigns responsibility for livestock breeding to federally recognized breeders' organizations, with the state setting the guide rails by reserving the right to recognize such organizations and by regulating artificial insemination. Due to the far-reaching effects of the new Ordinance on Livestock Breeding, the Z2 indicator only considers data collected as of 1999.

Figures 1 to 4 below illustrate the shares of various livestock breeds in the populations of herdbook animals of a species. Breeds representing only a few percent of any herdbook population have been merged into "Various" categories, with their numbers (as registered in the latest year) indicated in the figure key.

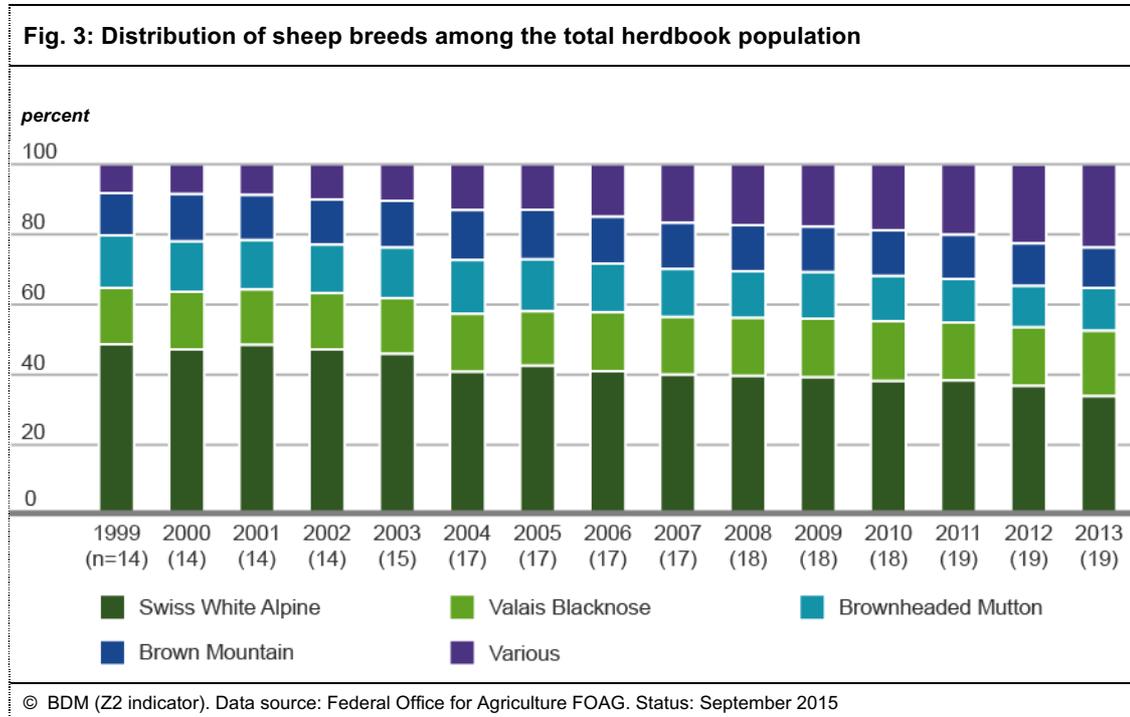
**Cattle**



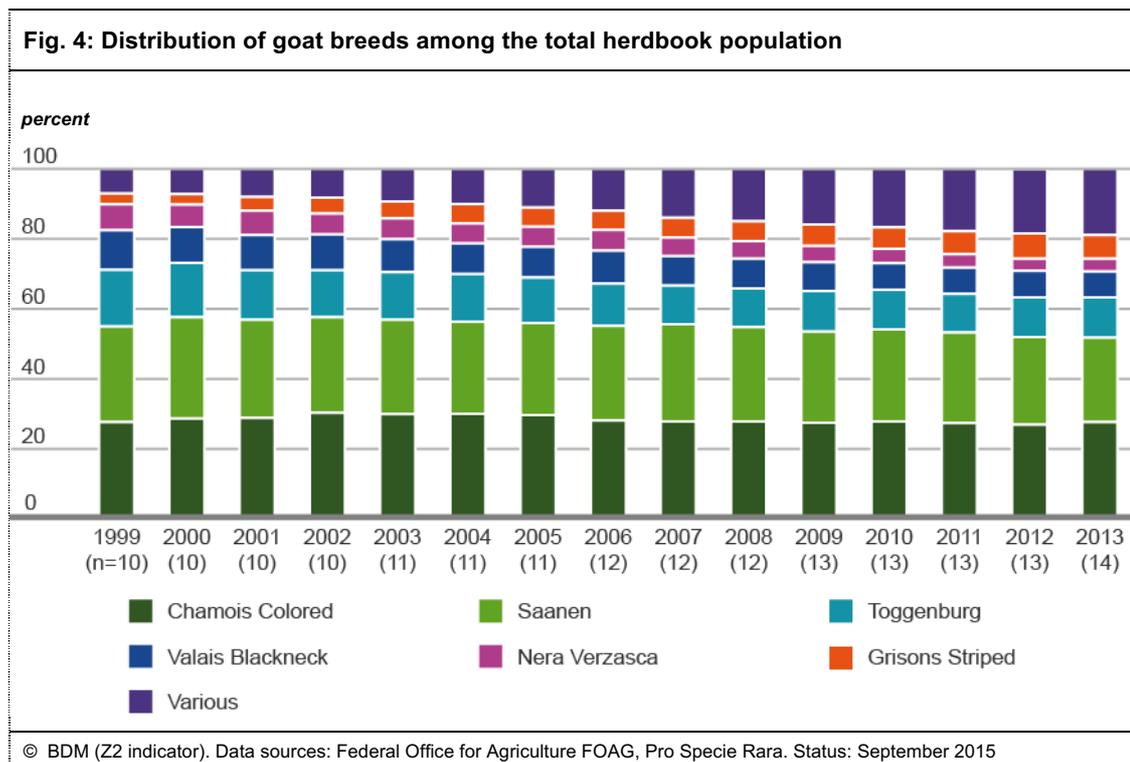
**Pigs**



Sheep



Goats



## Comments

- Merely a small proportion of the breeds kept in this country originate here, but for these few breeds, Switzerland takes particular responsibility. The federal government has set up dedicated conservation programs to promote livestock breeds that have been bred in Switzerland for at least 50 years and are considered to be endangered by international criteria. Likewise, the state subsidizes breeds that, even though not endangered, have steadily been dwindling in numbers for several years. In certain cases, Switzerland's particular responsibility is restricted to just one section of a breed. True to its name, the Original Swiss Brown, for example, originates in Switzerland, but nowadays, it only accounts for a minor proportion of Brown Cattle. For this reason, only the Original Swiss Brown section is subsidized with federal funds.
- Throughout all livestock species, the distribution of individual breeds among herdbook populations has hardly changed since 1999. While a few new breeds have been introduced in Switzerland, the total number of animals remains insignificant so far. Most of these breeds did not originate in this country, reaching much higher populations abroad. Switzerland does not take particular responsibility for such breeds.
- Populations of a small number of breeds are much larger than all others combined. The breed represented by the largest population makes up roughly 66% of herdbook animal numbers in pigs, 50% in cattle, 30% in sheep, and 25% in goats.
- In recent years, the populations of breeds featuring the largest numbers of herdbook animals have declined across almost all livestock species, while most rare species have been increasing in numbers. This trend is particularly marked in sheep and goats.
- Among sheep and goats (just as among small animals like rabbits and poultry), breed shares are somewhat more evenly distributed than among cattle and—to cite an extreme counterexample—pigs, since these species are mostly bred by enthusiasts. Rather than selecting a certain breed for performance reasons, enthusiasts choose by personal preference and tradition.
- Unlike cattle and goats, where roughly 30% of all animals are registered in herdbooks, the share of herdbook-registered pigs amounts to a mere 1%. The reasons for this are simple: Pigs are typically kept for meat production, and it is pointless to have slaughter animals registered in a herdbook. Furthermore, breeding pigs takes a relatively small number of animals, as a sow farrows several times a year. Finally, compared to other livestock species, pigs feature the smallest number of breeds. The share of herdbook animals fluctuates within a relatively narrow range for all species (with a maximum of roughly 7% for goats). Herdbook animals are issued with a pedigree certificate, which is required for exportation.
- Herdbook animal numbers of Jersey cattle have increased more than twentyfold since 1999. The milk of these stocky cows is distinguished by the highest fat and protein content of all recognized dairy cattle breeds. Breeding Jerseys is indirectly promoted by federal subsidies based on fat and protein content. Importing this breed was prohibited before 1995.
- Since 1999, agricultural policy has tended to promote beef cattle breeds. For example, the population of Angus beef cattle has been increasing, while the numbers of some dairy cattle breeds such as Brown Cattle have been declining. Moreover, as regards beef cattle, not only populations have been growing, but the number of subsidized breeds as well.
- Owing to a federal support program, the population of Evolene cattle has increased considerably. However, according to the guidelines of the United Nations' Food and Agriculture Organization (FAO), the Evolene breed is still considered to be endangered.
- After having dropped to an all-time low since the beginning of the data series in 2004, the total cattle population reincreased to the 1999 level in 2008. Since then, numbers have been slightly decreasing again. The total number of pigs was lowest in 1999 and highest in 2006, surpassing the 1999 level by roughly 35'000 animals in 2013. Ever since the population has been shrinking and is about 35'000 individuals bigger than in 1999. Reaching its lowest level so far in 2001, the sheep population had

been growing until 2006, but has been decreasing again since then, with numbers fluctuating within a range of roughly 40'000 animals. In 2012, sheep numbers dropped below even the low recorded in 2001. From 1999 until 2008, the total goat population has been steadily increasing by roughly 22'000 animals overall, amounting to plus/minus 86'000 animals since 2007.

- Populations of the Appenzell goats Copper neck goats and Capra Grigia have nearly tripled since 1999, when federally subsidized conservation programs were initiated for these three breeds. The population of the "Bündner Strahlenziege" more than tripled their numbers in this time period. The number of these rare breeds are increasing owing to the on-farm conservation support provided by the Pro Specie Rara organization.

For total numbers of individual breeds please refer to the Appendix.

#### **Data sources**

Federal Office for Agriculture FOAG

Federal Statistical Office FSO

Swiss Beef Cattle

Swiss Brown Cattle Breeders' Federation

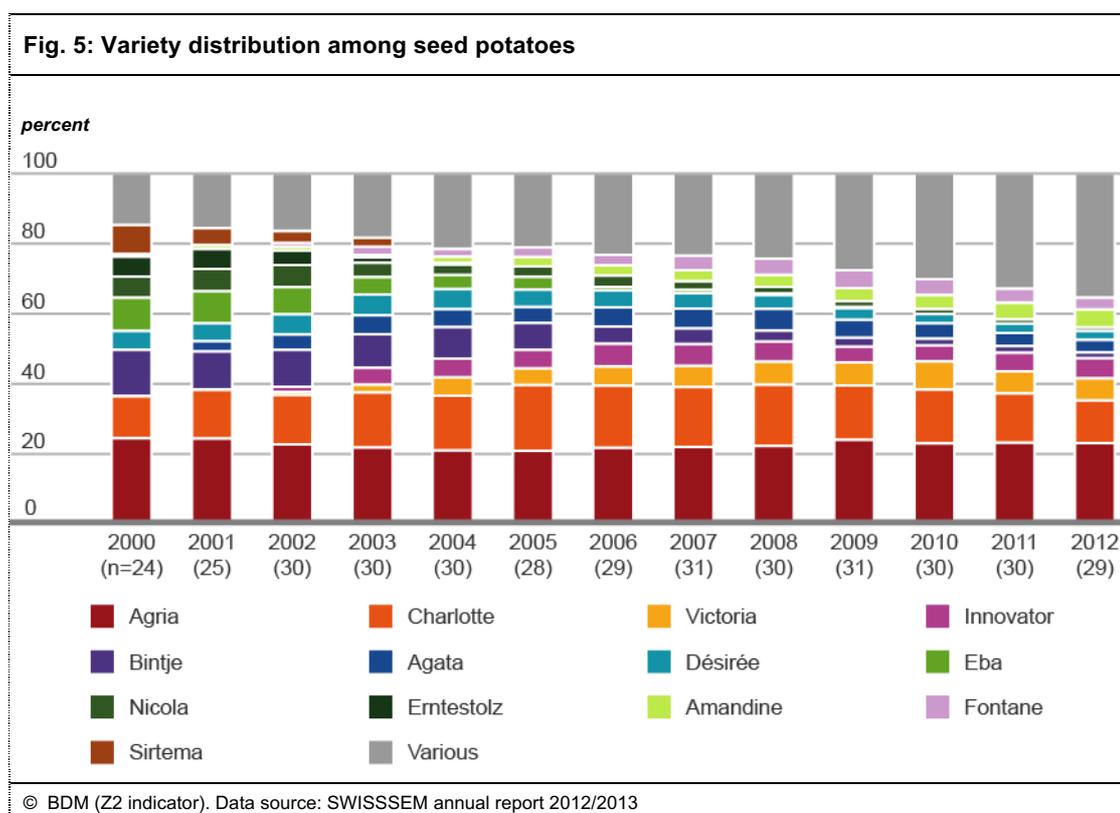
Pro Specie Rara

Swissherdbook (formerly Swiss Spotted Cattle Breeders' Federation)

## Crop plant varieties

Figures 5 to 21 below illustrate variety distributions among individual species of crop plants. Apples, pears and vines are compared by areas under cultivation, but there are no variety-specific crop area data available for potatoes and cereals. However, since it may safely be assumed that sales of seed potatoes and cereal seeds strongly correlate with the corresponding crop areas, variety distributions among potatoes and cereals are computed using the sales figures published by the Swiss Seed Producers' Association SWISSEEM in its annual reports.

### Potatoes



### Interpretation example

In 2012, Agria held an approximately 23% share in seed potato sales. The 19 varieties combined under “Various” account for 35% of all sales.

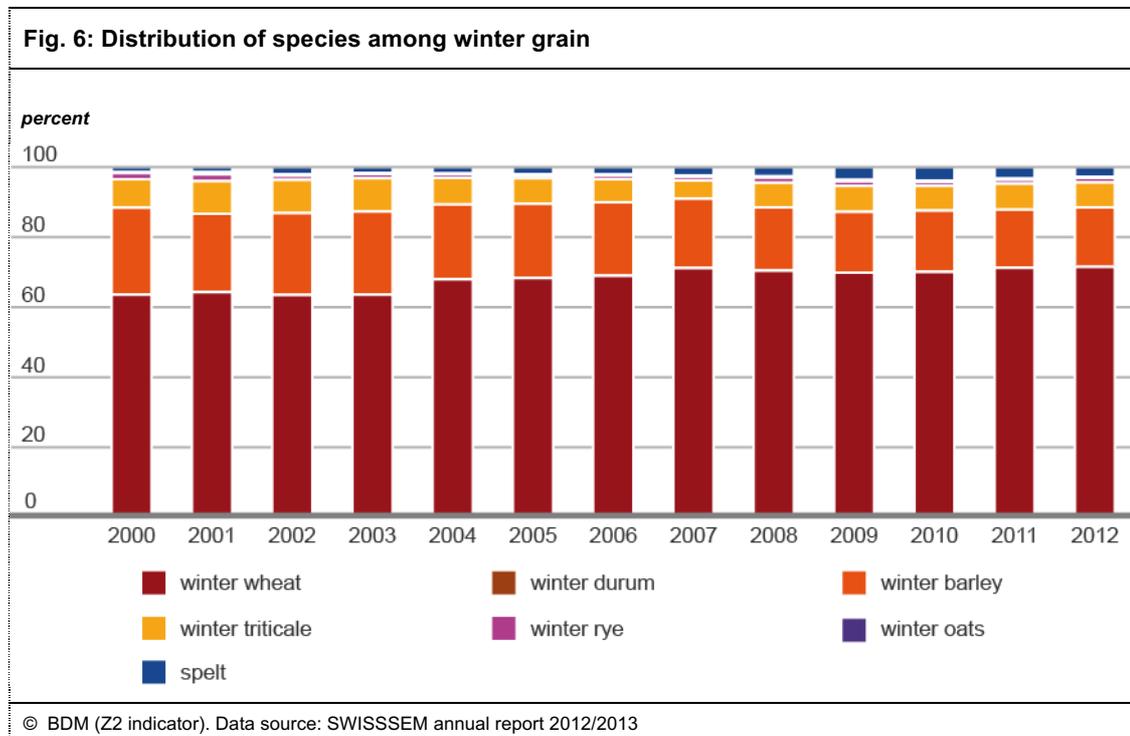
### Comments

- While “Various” represents a total of 38 varieties, not all of them were being sold every year: In 2012, for example, only 19 varieties were on offer.
- There is no differentiation being made between organic and conventional seed potatoes.
- With a few varieties taking up a large proportion of sales overall, variety distribution is rather one-sided.
- Roughly half of all seed potatoes sold belong to three (in 2000 and 2001) or four (as of 2002) varieties, and again almost half of those to the Agria variety.

- Since 2001, the number of varieties accounting for a roughly 70% combined share has increased from 6 to 10.
- Sales of Bintje, Eba and Nicola in particular have dropped off markedly, while sales of Innovator and Amandine have increased. Combined sales of the two main varieties Agria and Charlotte have always amounted to 35-40% share during the whole period under review.

## Cereals

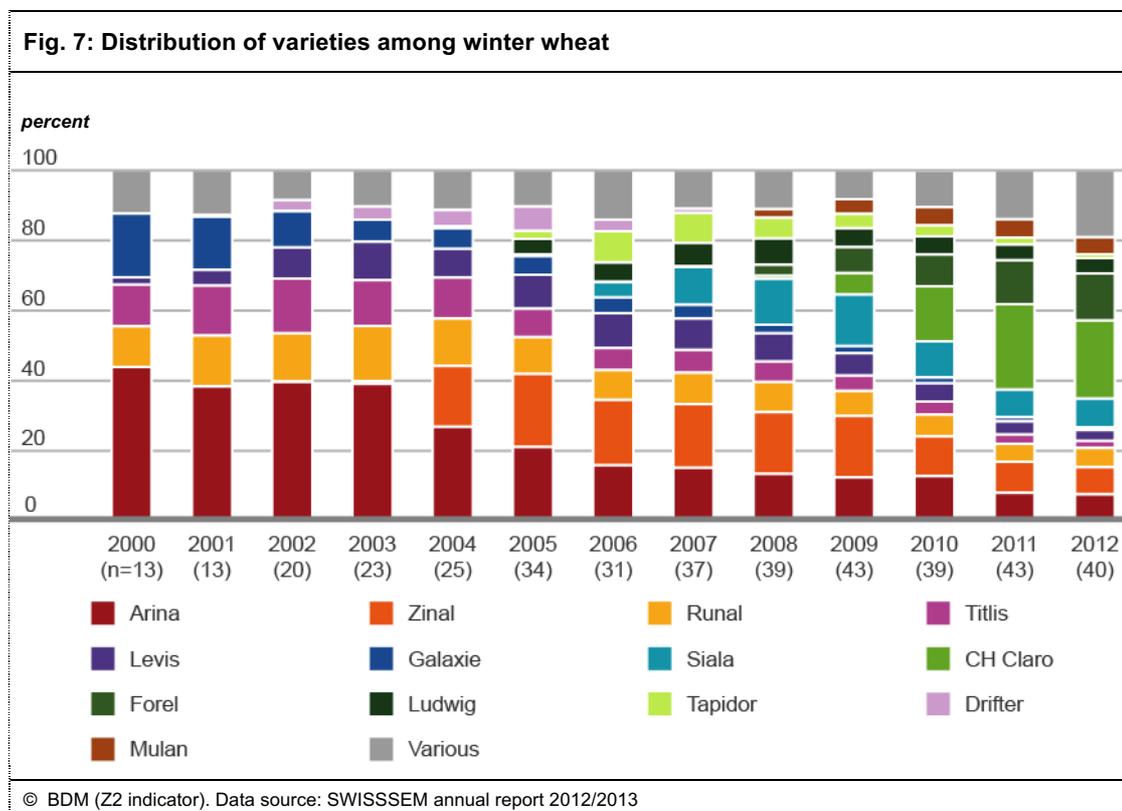
### Winter grain



### Comment

- Winter wheat accounts for roughly 60-70% of all winter grain, followed by winter barley and winter triticale. Spelt and winter rye are sold in insignificant amounts only, winter oats and winter durum sales are as good as irrelevant. Since the beginning of the data series, the amount of spelt produced, has continuously increased, albeit on a low level. Since 2011 however it's on a decline again.

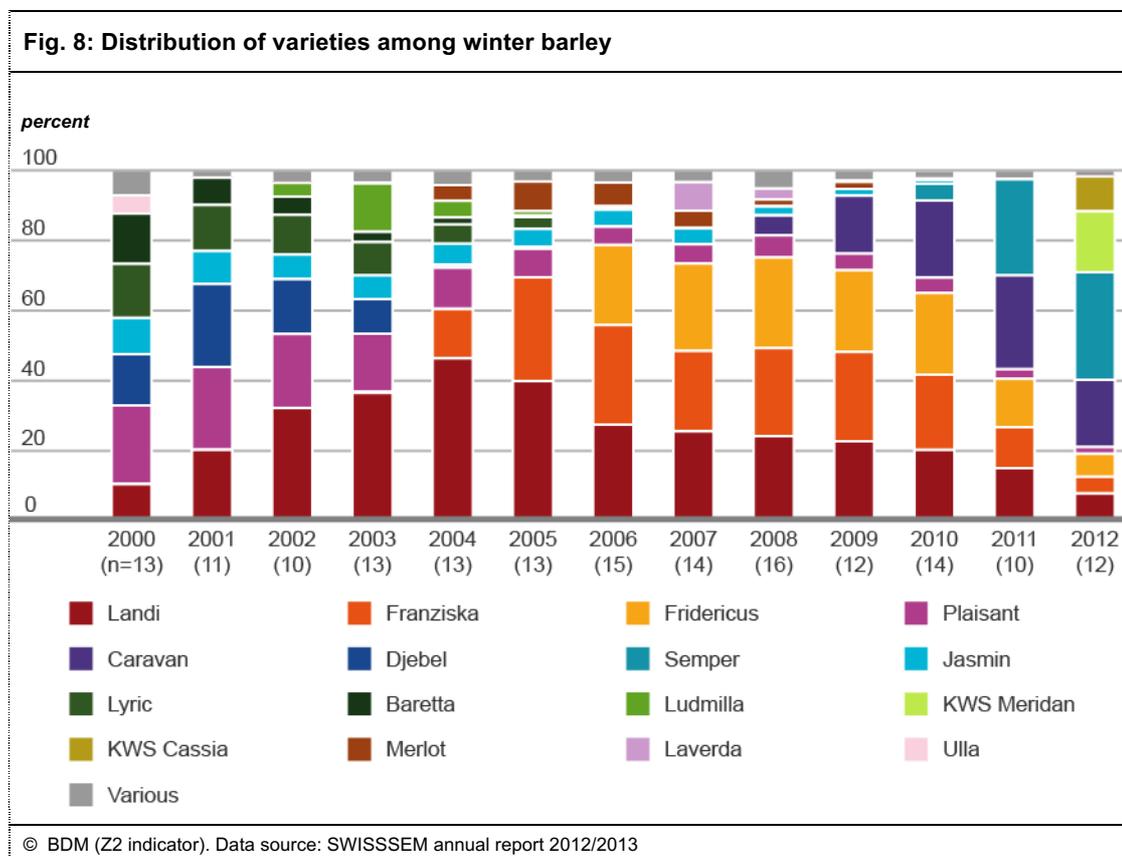
## Winter wheat



## Comments

- The number of winter wheat varieties has tripled since 2000. However, in 2012, four of them—CH Claro, Forel, Siala and Zinal—still made up roughly half of all winter wheat seed sold.
- Arina's share has been dropping since 2004. Another marked loss in importance has been recorded for Galaxie, which dropped from 18% in 2000 to 1% in 2012. The shares of Zinal, Tapidor and Siala increased in the meantime, but declined thereafter.
- Sales for CH Claro are rapidly increasing. After starting with a share of 1% in 2007, it reached 24% in 2011. Forel's sales display a similar growth. The share increased from 3% in 2008 to 14% in 2012.
- Overall, the range of winter wheat cropped in Switzerland has become more diverse since BDM monitoring began. In 2000 five varieties reached a market share of almost 90%. In 2013 the same share is distributed between 16 varieties.

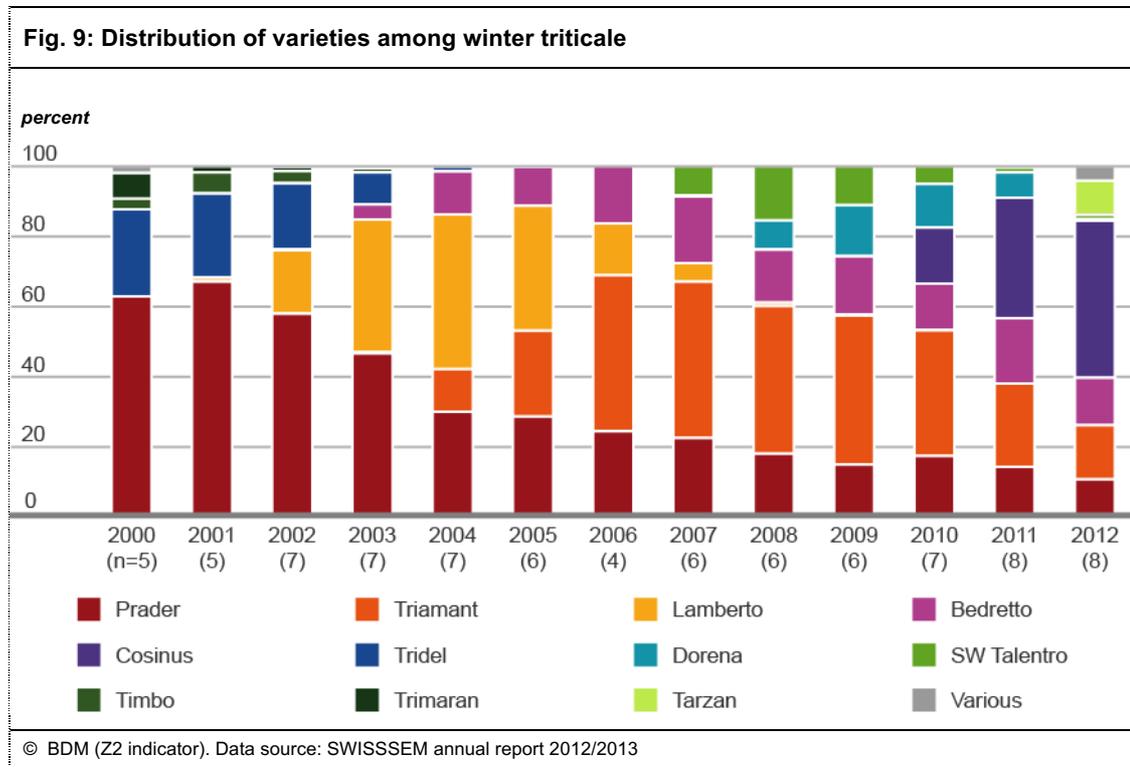
## Winter barley



## Comments

- Compared to winter wheat, variety distribution among winter barley is even more unbalanced. Close to 85% of all winter barley currently belong to one of five varieties. The main varieties are Semper, Caravan and KWS Meridan covering together around 67%.
- The grain types KWS Meridan and KWS Cassia replaced types Fridericus and Franziska from the list of the five most common varieties. Together they represent 27% of the seed sale in 2012.
- Plaisant, Baretta, Jasmin, Lyric and Djebel, varieties that were very common at the beginning of the reviewed time period, are almost non-existent in 2012.
- The category “Various” is steadily losing in market share, from 7% made up of 6 varieties in 2000 to 2% made up of 4 varieties in 2012.

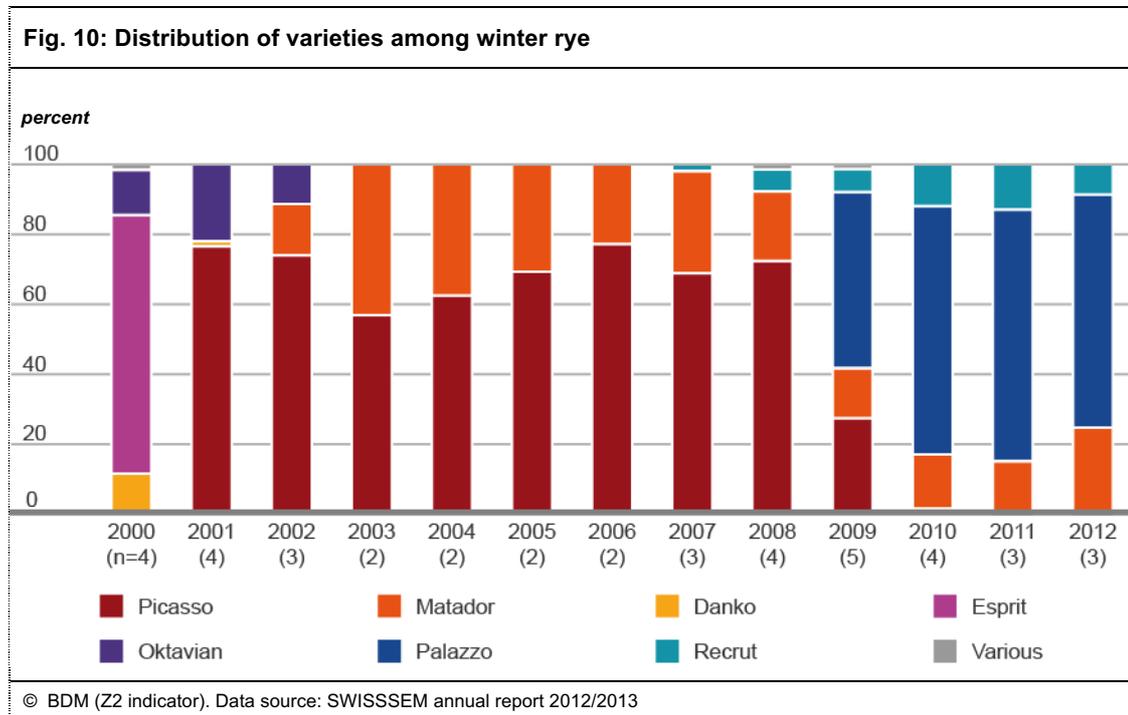
## Winter triticale



## Comments

- With only four to eight varieties being cultivated in any given year, diversity is low.
- There is a change of varieties emerging in the period under review: Prader is dropping off, Tridel has disappeared, and Lamberto, Bedretto and Triamant are on the rise. Since reaching its maximum share in 2004, however, Lamberto has been on the decline, disappearing from the market in 2012. In 2007, the available range was enlarged by two new varieties: SW Talentro and Dorena. In 2008 and 2009 SW Talentro's and Dorena's sales numbers reach a maximum share. As of today both varieties were replaced by the variety Cosinus, which reached a share of almost 45% in 2012

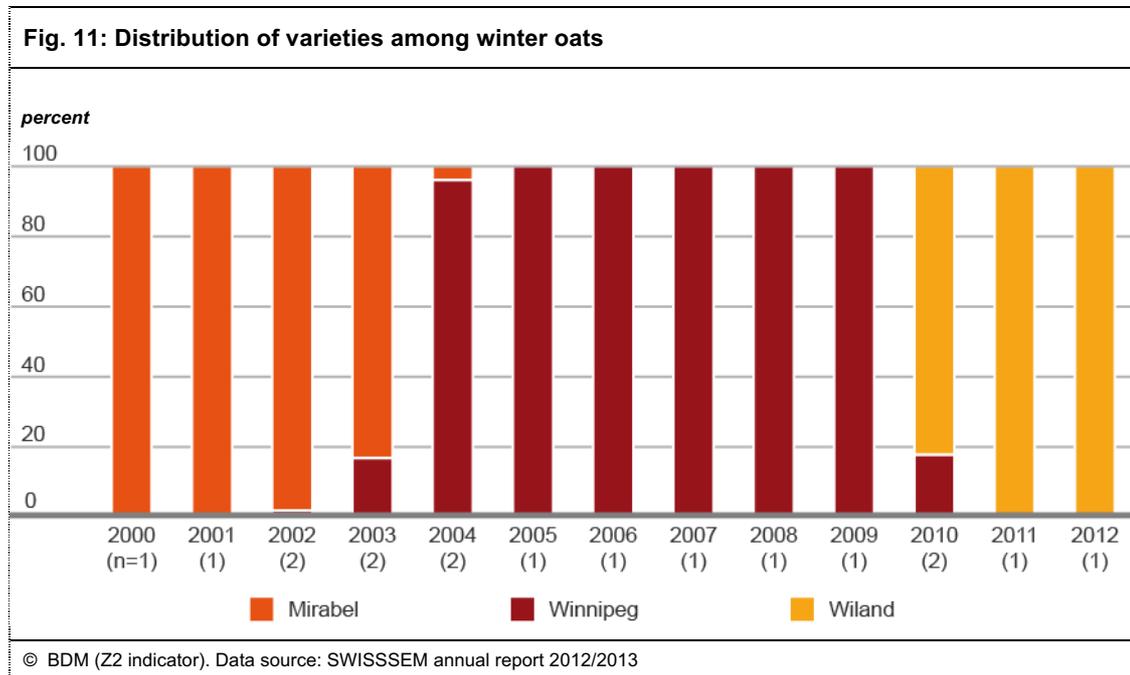
## Winter rye



## Comment

- In the period under review, diversity dropped from four to two varieties, only to increase back to five, and declining again to three in 2012. Additionally, there was a complete change over of varieties. From 2003 to 2006 Picasso and Matador were the only varieties offered by SWISSEEM. In 2009 the variety Palazzo is introduced and reaches a sales share of about 50%. Two years later it reaches a maximum of 72%. As of today it lost some market share to the variety Matador, which is regaining in strength, but it's still the most sold variety with a share of 67%.

## Winter oats

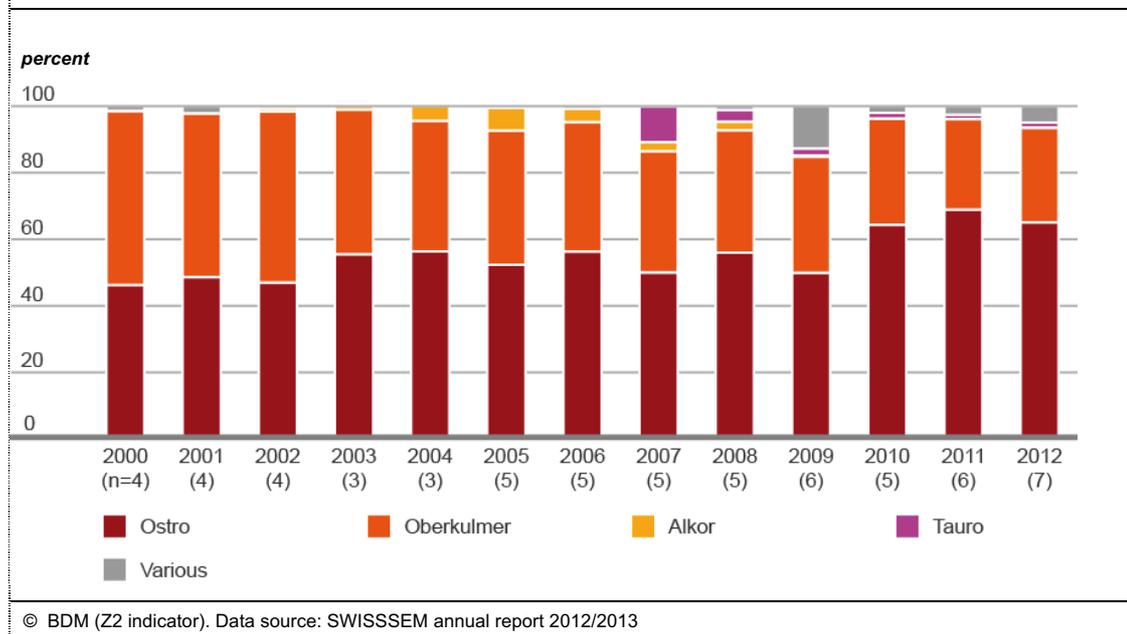


## Comment

- With three registered varieties diversity is almost nonexistent in the whole period under review. Winnipeg, which appeared in 2003, replaced the variety Mirabel completely in 2005. 2010 the variety Wiland was introduced to the market and reached immediately a share of 82%. Since 2011 it's the only winter oats variety on sale at the Swiss market.

## Spelt

Fig. 12: Distribution of varieties among spelt

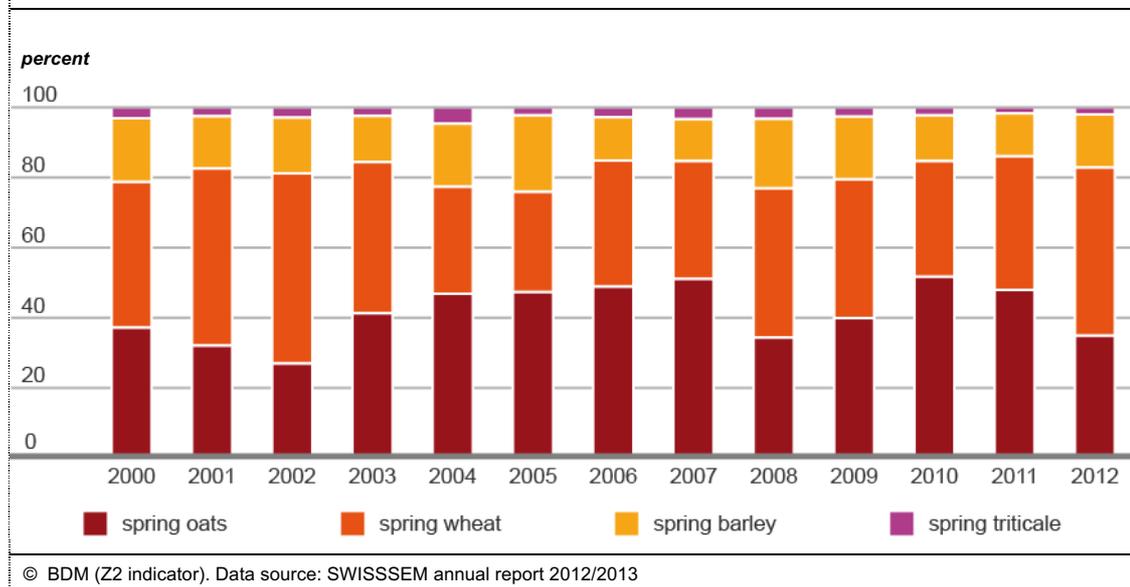


## Comments

- Variety diversity is very low.
- Ostro and Oberkulmer are absolutely predominant, contributing together a share of over 90% for the reviewed time period with exception of the years 2007 and 2009. In 2007 Tauro entered the market, with a share of almost 11%. However, its share dropped to 4% in 2008. It declined further to 2% in 2012. The category "Various" containing three varieties has a share of 5% in 2012.

## Spring grain

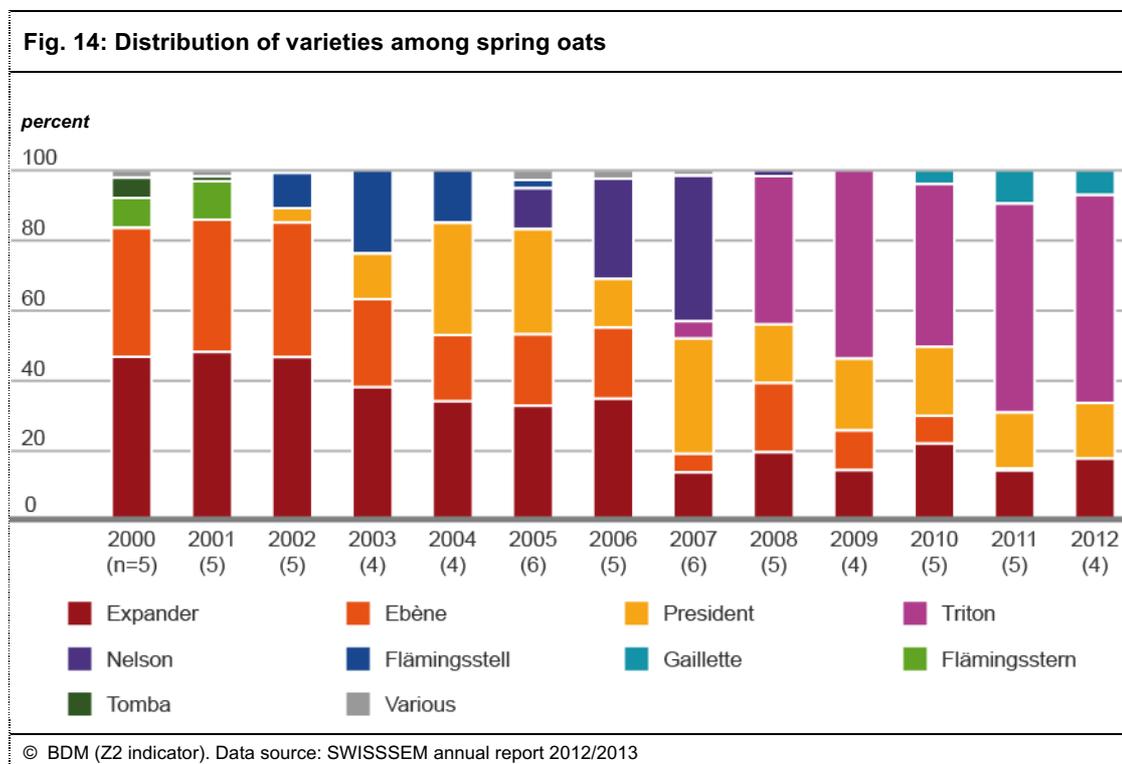
**Fig. 13: Distribution of species among spring grain**



## Comments

- Spring oats, spring wheat and spring barley are widely cultivated, followed at a distance by a little spring triticale.
- Spring wheat and spring oats are in interplay. If spring wheats share is rising then spring oats share is declining and vice versa. This interplay can be observed several times in the reviewed time period. 2010 and 2011 spring oats had a bigger share, which changed in 2012 in favor of spring wheat. Spring barley shares are fluctuating.

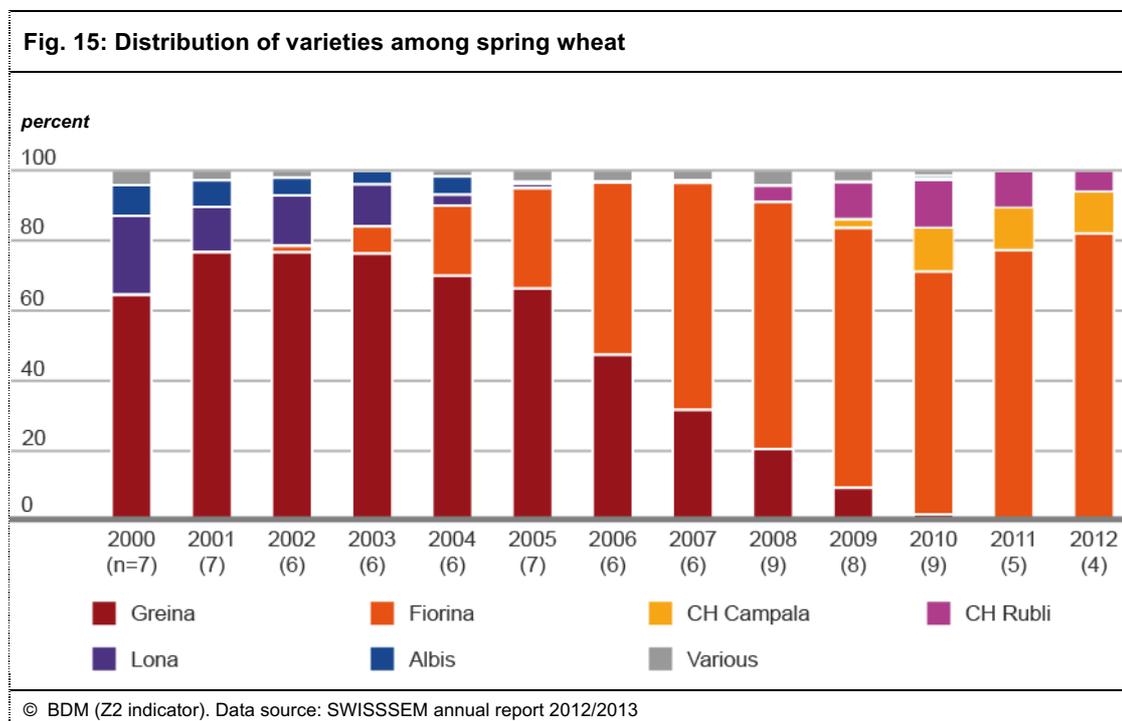
## Spring oats



## Comments

- Consisting of only four to six varieties respectively over the years, diversity is not very wide.
- Distribution of varieties is in 2012 almost as unbalanced as in the time period 2000 to 2002. Back then two varieties, Expander and Ebène, covered more than 80% of the seed sales between them. In 2012 Expander and Triton predominate similarly with 77%.
- Since its introduction in 2005, Nelson had steadily been gaining ground until 2007. In 2008, however, Nelson suffered a distinct loss in market share that is now claimed by Triton, disappearing completely in 2009.
- In 2010, a new variety named Gaillette was added to the mix. Ebène continued to decline and disappeared in 2012. Triton reached its height in 2011 at 60% and was sold as often in the following year.
- Expander's share, which reached once almost 50%, has dropped to 18% in 2012.

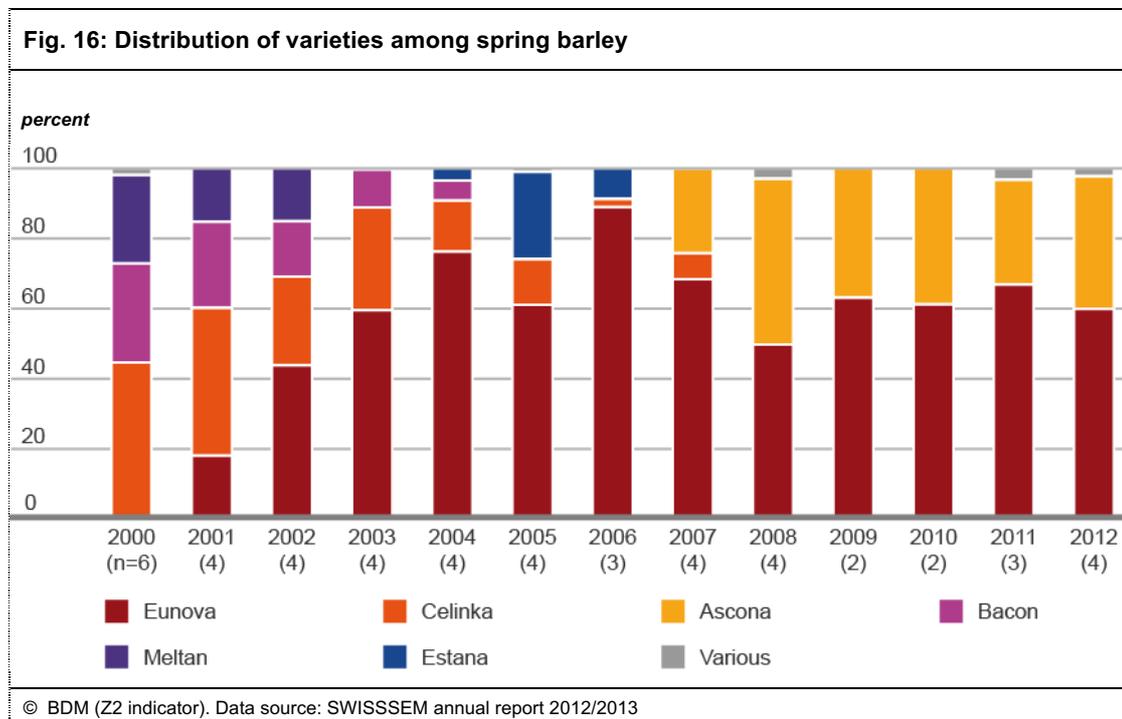
## Spring wheat



## Comments

- The diversity of spring wheat varieties is low in all observed years dominated by one variety, which has a share of at least 50%. In 2008 Fiorina and Greina accounted for roughly 90% of all spring wheat seed sold. The situation was similar in 2012, the only difference being that Greina's place had been taken by CH Campala. Together they have a market share of 89%. Greina is not available anymore.
- As the early years of the time series show, Lona, an initially important variety with 23% market share, has been completely displaced by Fiorina in 2008.
- CH Rubli dropped from 14% in 2010 to 6% in 2012. CH Campala, which was introduced in 2008 with a share of 0.1% and reaching a share of 12% in 2012, took the place of CH Rubli.
- The group "Various" has almost disappeared in 2012 with only one variety and a market share of 0.02% .

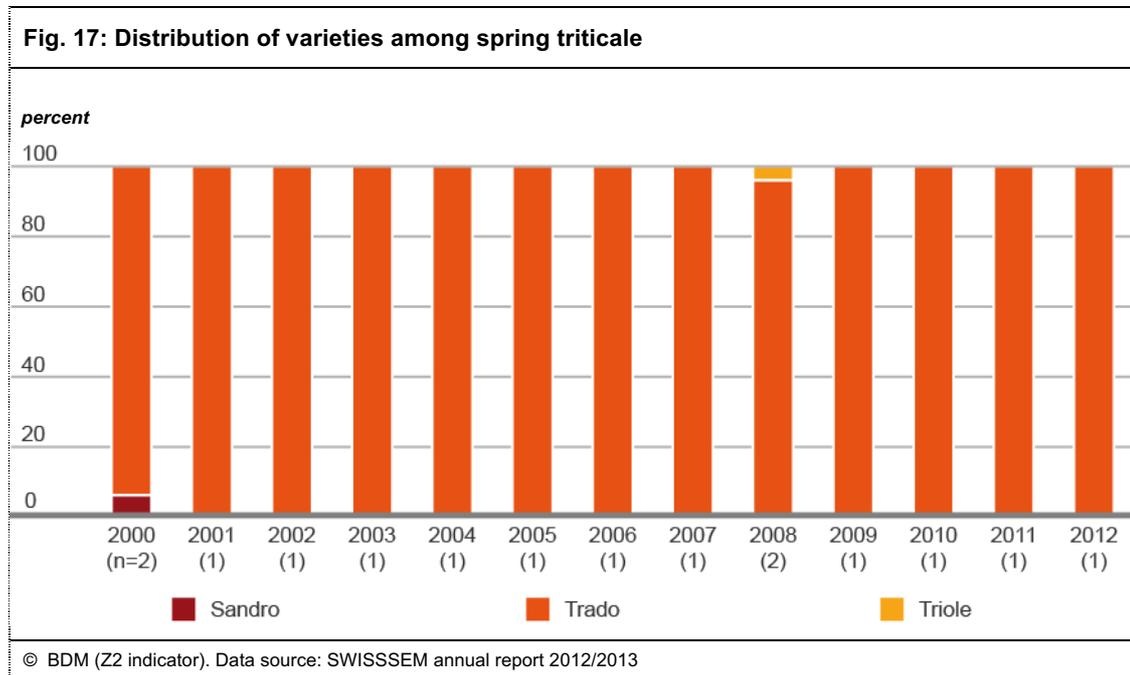
## Spring barley



## Comments

- At an average four varieties, annual diversity has been low from the year 2000 to 2008. In 2009 and 2010 diversity dropped to two varieties. In 2011 and 2012 the varieties Beatrix and Quench bio are added.
- The varieties Eunova and Ascona, which appeared in 2001 and 2008, replaced previous varieties like Bacon, Meltan and Estana completely. In 2006 Eunova reached a share of 89%. It dropped with the appearance of the variety Ascona and is at 60% in 2012. Ascona has a share of 38%.
- Since 2001, ten varieties have disappeared altogether: Michka, Secura, Meltan, Silvretta, Bacon, Danuta, Celinka, Estana, Ria and Xanadu.

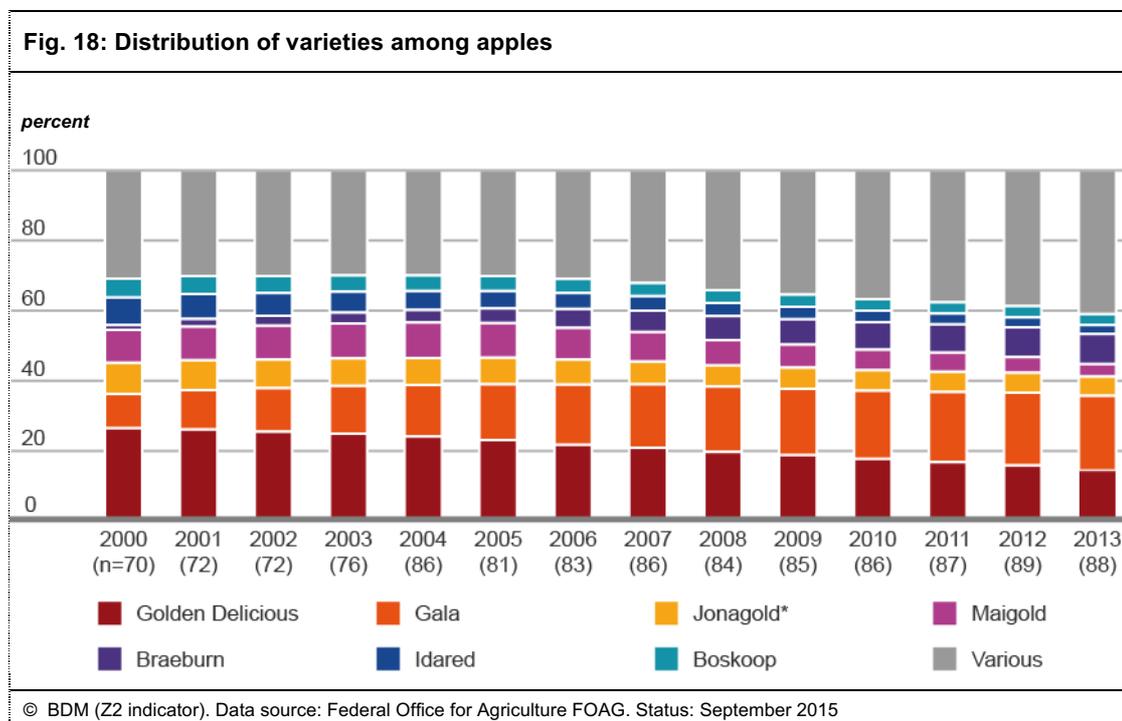
**Spring triticale**



**Comment**

- With only one variety available on the market except in 2000 and 2008, diversity is at a minimum. The new variety named Triole that was added to the seed offer in 2008 vanished again the very next year.

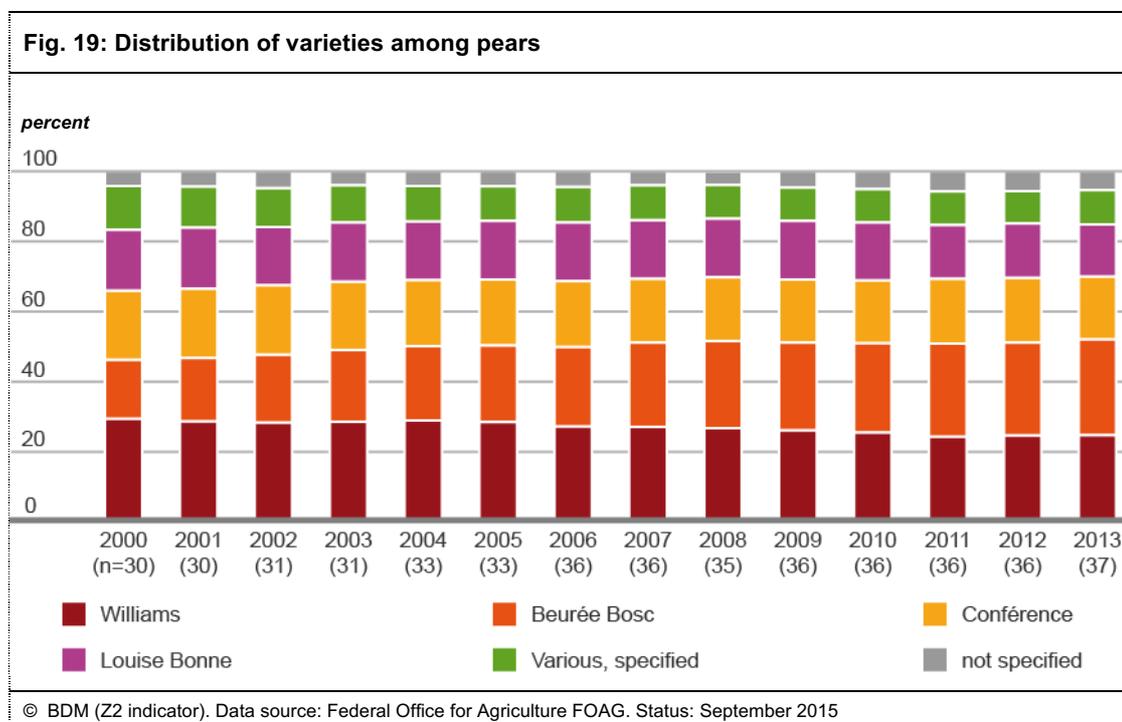
## Apples



## Comments

- The “Various” category represents a total of 81 varieties (including the “not recorded by variety”, “cider apples”, and “other varieties covering less than 40 ares” groups). Jonagold\* encompasses Jonica, Rubinstar and Wilmuta.
- While the diversity of commercially grown varieties (2013: 88 varieties) seems very wide at first, it is low compared to the total of 819 varieties available in Switzerland (cf. Z1 indicator). In the period under review, 105 commercially grown varieties (without the “not recorded by variety”, “cider apples”, and “other varieties covering less than 40 ares” groups) were recorded overall, but variety distribution is very one-sided.
- In 2013, close to two thirds of the country’s apple-growing area were cultivated using 8 out of 105 specified varieties.
- Three varieties cover 44% of the apple-growing area.
- The “Various” category has been slightly increasing its market share in recent years, even though statistics do not reveal at whose expense.
- Shares held by the main varieties remain rather constant over the years, which is not surprising given the long life of apple orchards. Still, some weak trends towards change are emerging: Gala and Braeburn are slowly gaining popularity, while Golden Delicious is declining from 24% to 14%, Maigold from 10% to 4% and Idared from 8% to 3%.

## Pears



## Comments

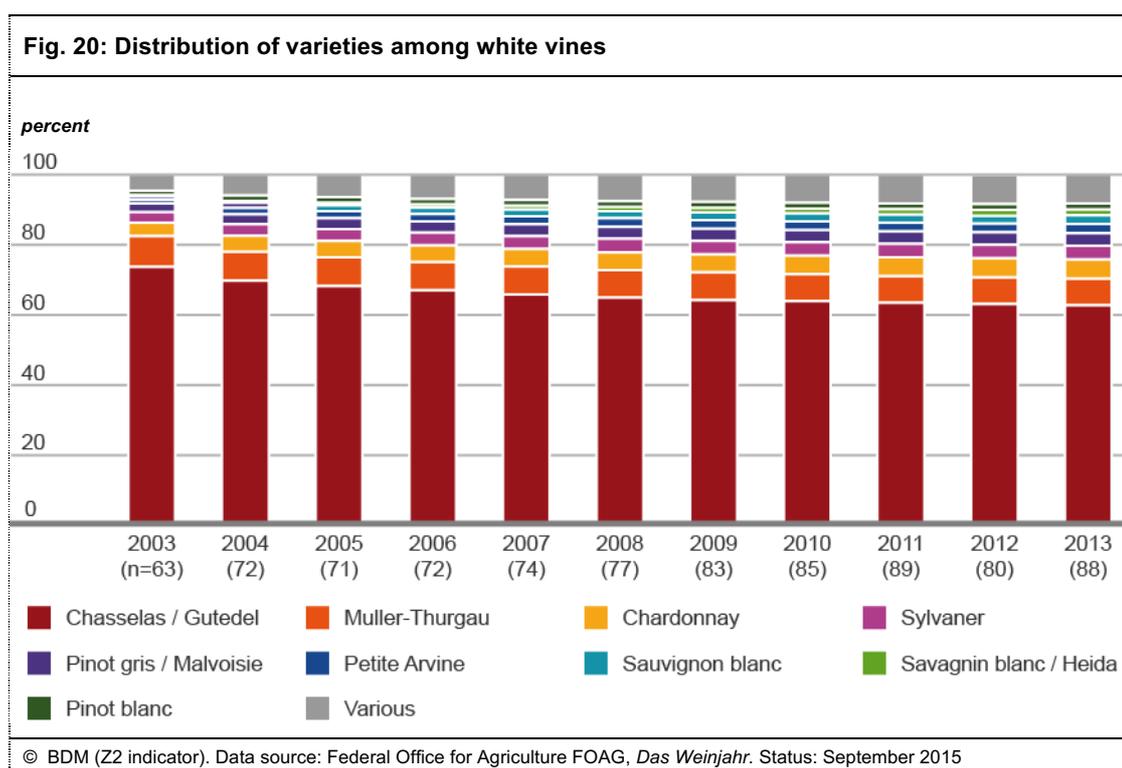
- The category “Various” consists of 32 varieties including cider pears. The “not specified” category comprises pear orchards not allotted to any variety (5% on average).
- Surveys record a total of 38 pear varieties not including cider pears and the “not specified” category.
- Almost 85% of Switzerland’s pear-growing area are planted with one of four varieties.
- In the period under review, shares held by the four main varieties stayed even more constant than in the case of apples. While the share of Beurée Bosc has been increasing slightly, Williams’ popularity is declining.

## Vines

Surveys record European and interspecific vine varieties, subdivided into red and white vines. At 58%, vineland is mainly planted with red vines, a trend that is increasing judging by the average computed for 2003-2013.

## White wine varieties

Relative shares refer to the total vine-growing area covered by white wine varieties. "Various" unites a total of 93 varieties over the years, each with a low individual surface share.

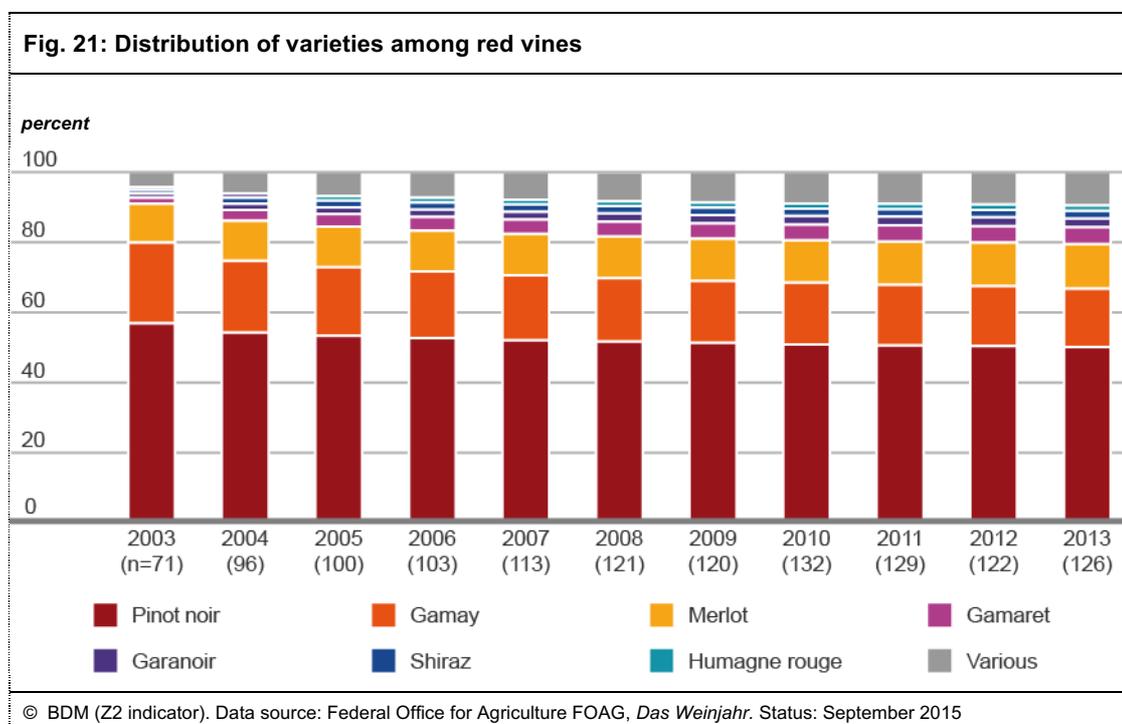


## Comments

- Consisting of 88 varieties recorded in 2013, variety diversity may be wide, but variety distribution is very one-sided.
- Almost 90% of Switzerland's white vine-growing area are planted with one of 8 varieties.
- Switzerland is Chasselas country: at roughly 63% (2013), Chasselas clearly is the leading variety, albeit with a declining trend. It is followed by Muller-Thurgau (also known as Riesling x Sylvaner) and Chardonnay.
- Varieties united in the "Various" group include specialties such as Amigne, Marsanne blanche (Ermitage) and Gewürztraminer.

### Red vine varieties

Over the years, the “Various” group comprised 154 varieties, each with a low individual share in the total vine-growing area covered by red vines.



### Comments

- Red vine diversity is in 2013 with 126 out of 161 varieties overall bigger than the diversity of white vine. Moreover, the main varieties of red vines are not as dominant as the ones of white vines.
- Covering a roughly 50% surface share (2013), Pinot noir is the main red variety, followed by Gamay and Merlot. However, the share held by these three varieties has been decreasing in the period under review, particularly affecting Pinot noir and Gamay.
- The cultivation of the following varieties has been increased: Gamaret, Garanoir, Shiraz and Merlot.
- Increases were also registered within the “Various” group, for example Diolinoir, Cabernet franc and Cabernet sauvignon.
- Around 30 varieties have dropped out of statistics altogether during the period under review. However, it is not clear whether they have truly disappeared or they are simply no longer being recorded individually. At any rate, their volume has always been insignificant.

## Changes of variety

In the course of time, varieties are being replaced by one or several typically new varieties. This matters most for varieties that cover major shares of land (> 5%). In the period under review, changes of variety primarily involved annual cultures such as cereals or potatoes. Obviously, varieties, like consumer goods, have a life cycle. Various factors play a role in determining why a new variety emerges, has its heyday, and then disappears again on a large-scale or cannot gain a foothold at all: buyers (along with the consumer market), producers (farmers), seed producers, the Federal Office for Agriculture FOAG (by way of the Ordinance on a National Catalogue of Plant Varieties), breeders, and even institutions recommending certain varieties. But it is probably the buyer and the consumer markets that represent the most crucial factor influencing this process, since it does not make sense for the individual farmer to produce goods that fail to meet the needs of the market. For one thing, products must meet the required properties for industrial processing. At the same time, farmers depend on seed suppliers. Moreover, only growing a crop will reveal which varieties are suitable for a farm's particular soil and climate conditions.

As evidenced by a study of wheat cultivation in Switzerland (*Fossati, L.; Brabant, C., 2003: Die Weizenzüchtung in der Schweiz. Agrarforschung 10, 447-458*), changes of variety are not a phenomenon of recent decades. Like "Probus" in the 1960s, certain varieties prevail for a limited period of time, but in due course, others will take their place.

## Significance for biodiversity

Overall genetic diversity increases along with the total number of breeds/varieties. Within a breed/variety, genetic diversity increases along with the size of the population/crop area, since every individual generates a new genetic variation—unless it has been cloned (reproduced asexually). Clones are genetically identical. Vines, apples, pears and other crop or ornamental plants are mostly produced by vegetative propagation. However, Switzerland's biodiversity would benefit from large populations/crop areas of the greatest possible number of livestock breeds/crop plant varieties, above all breeds/varieties predominantly occurring in this country. The reason for this is simple: Genetic diversity provides a kind of life insurance, allowing breeds/varieties to adapt to changes in their environment. If, for example, the climatic or geographic conditions in a region were to change, some individuals within a given population will likely be better equipped to adjust, which improves their chances to reproduce and pass on their genes to the next generation. As a result, the species as a whole will be enabled to adjust. The same applies in case of parasite infestations, infectious diseases, or epidemics. Cloned organisms, however, fail to follow this pattern, as their hereditary information is identical.

Still, survival of the fittest tends to be the exception as regards livestock and crops, since most breeds/varieties are created by human selection. In breeding livestock/crops, people select for optimum fulfillment of certain human requirements such as milk or meat production. Most farmers prefer the kind of breeds/varieties that offer the best input-output ratio, so livestock/crop farming is restricted to a small number of breeds/varieties with correspondingly large populations. By contrast, low-performance breeds/varieties will at best be found on niche production or enthusiasts' farms, which results in smaller populations or crop areas. Nevertheless, both animal/plant breeding and biodiversity would profit if populations of rare breeds/varieties were to increase. Not only would this provide breeders with a larger pool to select from, but the sustained development of new and improved breeds/varieties does not necessarily have a negative impact on biodiversity in general. For example, fungus-resistant vine varieties require fewer or no fungicide treatments, which in turn benefits other organisms living in vineyards.

The situation has been improving for some time now. Breed diversity within total species populations has been increasing since before 1999, as import regulations were loosened in 1995, enabling farmers to keep a great variety of breeds for niche production purposes (see Z1 indicator). However, shares held by various breeds within the total populations of their respective species have remained almost unchanged since 1999. While new breeds keep being added all the time, increasing genetic diversity in the process,

their shares in total populations are negligible. Still, populations of some rare breeds are growing at a substantial rate. But their shares in the total species population remain very small all the same because populations of main breeds are a hundred or even a thousand times larger than populations of all other breeds. Traditional breeds continue to be more widespread than newcomers.

The trend observed in crop plants is mixed: Perennial crop plants such as vines, apples and pears follow a development similar to that of livestock breeds, while cereals and potatoes are undergoing a change of varieties, at least as far as the dataset used for this indicator is concerned.

Diversity may be lost within a breed/variety as well. If a breed/variety is selectively bred for one single feature only, its genetic base will progressively narrow, losing part of its diversity as time goes by. Luckily, features aimed at in breeding change time and again, since requirements to be fulfilled by livestock and crop plants change as well. Moreover, breeders are aware of the dangers of inbreeding nowadays, so they continuously try to refresh breeding populations. Since the federal government relaxed livestock breeding regulations in 1999, animals of one and the same breed may be selected for differing performance traits (e.g. beef cattle and dairy cattle). As a result, genetic diversity increases.

However, genetic diversity not only depends on the population size of a breed, but also on the number of sires/pollinators involved in the reproduction of a breed/variety. In the old days, for example, every village used to have its own bull, which literally shaped the local herd. Today, anybody can order the semen of any bull, as artificial insemination has become the rule since the 1980s. Yet farmers all over Switzerland tend to prefer the same bulls, i.e. those labeled "best of breed". Consequently, a large percentage of animals within a breed may have the same father. For example, a bull by the name of "Pickel" (Spotted Cattle, Red-Holstein section) fathered 30,000 female offspring in a period of little more than ten years. A dominating influence such as this will inevitably cause genetic diversity to suffer. Hence, breeders' organizations will inform breeders of potential inbreeding problems that may occur if a certain bull were to be used with a certain bloodline.

Maintaining and encouraging genetic diversity within populations is especially important in the case of endangered breeds and varieties. For this reason, the federal government supports projects monitoring the genetic range within the populations of four endangered sheep breeds (Bündner Oberland, Red Engadine, Valais Red and Mirror Sheep), and within populations of Evolene Cattle and Booted Goats.

Animals not registered in a herdbook represent a genetic potential that may be more diverse than that of purebred herdbook animals which were specifically selected for certain features. However, this potential is being neglected, since only herdbook animals are used for breeding.

## Definition

### **Changes in the shares of various livestock breeds and crop plant varieties in the total population/production of the corresponding species in Switzerland.**

A livestock breed is considered to be any homogeneous group of farm animals differentiated from other groups within the same species by predefined visible features.

For the purposes of the Z2 and Z1 indicators, farm animals are considered to belong to a certain livestock breed or species if they are registered in a herdbook kept by a federally recognized breeding organization.

## Surveying methods

### Livestock breeds

Federally recognized breeding organizations keep records of livestock populations. Such herdbooks contain surveys and records on bloodlines, identification, performance and quality features as well as the physical appearance of a breed's or breeding population's breeding animals. The Federal Office for Agriculture FOAG keeps a list of the populations of all breeds entitled to federal subsidies.

Switzerland's overall population of farm animals is subject to an annual survey by the Federal Statistical Office FSO. This survey records all farm animals kept on a farm meeting a certain minimum standard. This minimum standard is defined as follows: 1 hectare of arable land, or 30 ares of special crops, or 10 ares of greenhouses/tunnels, or 8 brood sows, or 80 fattening pigs or fattening pig spaces, or 300 poultry. Farm animals kept on farms that do not meet the minimum standard will not show up in any statistics. This frequently applies to sheep, so the total sheep population indicated is estimated to be several thousand animals below the actual count. However, cattle, pigs and goats are largely covered by the survey.

### Crop plant varieties

The Z2 indicator covers crop plant species and their varieties provided there are reliable datasets available for all of Switzerland. In principle, it would be best to obtain data categorized by variety-specific crop areas. Corresponding datasets are at least partially established for perennial crops such as fruits and vines. The Federal Office for Agriculture conducts an annual statistical survey of fruit plantations in Switzerland, published under the heading of *Obstkulturen in der Schweiz* (not available in English). At 38% and 31% respectively (data collected in 2011), a rather large percentage of both cherry and plum/damson plantations are not recorded sorted by variety. Since there is no way of knowing what is hidden behind these generalized data, it is impossible to get a conclusive idea of the situation. For this reason, the Z2 indicator only considers apples and pears at this time.

Z2 data on vine varieties are also based on an annual statistical survey compiled by the Federal Office for Agriculture and published under the heading of *Das Weinjahr* (not available in English). Data are provided by the official grape harvest controls carried out by the cantons.

As regards potatoes and cereals, there are no variety-specific crop area data from direct surveys available for all of Switzerland. Hence, the Z2 indicator uses seed potato and cereal seed sales figures supplied by the Swiss Seed Producers' Association SWISSEM. Without verification, Z2 indicator information proceeds on the assumption that sales figures for seed potatoes and cereal seed strongly correlate with crop areas, as it would not make any sense to buy seed in order to stockpile it. This is even less likely in the case of seed potatoes. Seed sold by other organizations is not taken into account, but doing so would not distort the overall picture of a small number of varieties claiming large market shares.

## Further information

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### Related indicators

> Z1 "Number of Livestock Breeds and Plant Varieties"

### Additional sources of information

> [www.admin.ch/ch/d/sr/916\\_310/index.html](http://www.admin.ch/ch/d/sr/916_310/index.html) Swiss Ordinance on Livestock Breeding (not available in English)

> [www.blw.admin.ch/themen/00013/00082/00087/index.html?lang=de](http://www.blw.admin.ch/themen/00013/00082/00087/index.html?lang=de) list of recognized breeders' organizations in Switzerland (pdf not available in English)

> [www.blw.admin.ch/themen/00013/00084/index.html?lang=de](http://www.blw.admin.ch/themen/00013/00084/index.html?lang=de) vine growing statistics (not available in English)

> [www.blw.admin.ch/themen/00013/00083/00107/00158/index.html?lang=de](http://www.blw.admin.ch/themen/00013/00083/00107/00158/index.html?lang=de) fruit growing statistics (not available in English)

> [www.prospecierara.ch](http://www.prospecierara.ch) *Pro Specie Rara*, the Swiss Foundation for the Cultural and Genetic Diversity of Plants and Animals (no information in English)

> [www.braunvieh.ch](http://www.braunvieh.ch) Swiss Brown Cattle Breeders' Federation

> [www.swissherdbook.ch](http://www.swissherdbook.ch) Swissherdbook (formerly Swiss Spotted Cattle Breeders' Federation; no information in English)

> [www.mutterkuh.ch/en/](http://www.mutterkuh.ch/en/) Swiss Beef Cattle, the Swiss Association of suckler cow husbandry

> [www.swissem.ch](http://www.swissem.ch) Swiss Seed Producers' Association (no information in English)

> [www.kartoffel.ch](http://www.kartoffel.ch) Swisspatat Swiss Potato Industry Organization (no information in English)

### Additional non-illustrated appendices

> Appendix 1: Populations of individual livestock breeds

*This information is based on the German-language document 1260\_Z2\_Basisdaten\_2013\_v1.docx dated 30. September, 2015.*