# The development of farming

**The food that we eat and methods used to bring it to the table have changed dramatically since the dawn of mankind. Our diet and the quality of food that we eat today has changed beyond recognition in comparison to what our ancestors would have eaten thousands of years ago. Even looking back a few hundred years would have revealed major advances in science and technology that have influenced what we eat. Today there are more than 5,000 varieties of apples and over 500 cultivars of oranges. These are just two examples, but the pattern is repeated for most crops.**

To put the modern diet into perspective it is important to see how our food and farming methods have changed through history. There are three main areas in history that have seen these changes take place. The first major change was about 10 to 12 thousand years ago at a time known as the Paleolithic age. At this stage food was obtained directly from the wild in the form of collecting wild plants and hunting wild animals. This changed gradually when ancient man started to change from a nomadic lifestyle to a more settled existence. This involved the growing of favorable plants and the domestication of livestock. This was the start of the Neolithic age.

Little changed until around the 1700's which saw the invention of machines that were used in the production of crops and then the use of chemicals and fertilizers in the 1940's.

## Ancient Origins

The Paleolithic or Stone Age started from about 2 Million years ago and lasted to about 10,000 years ago when it became the Neolithic or New Stone Age.

Paleolithic people would have lived off the land in the style of the 'hunter-gatherer'. Plants and animals would have been obtained directly from the wild by collecting plants from the local areas and by hunting wild animals. They would have led a nomadic lifestyle because they needed to move into new areas to obtain food and to follow the seasonal changes that affected what food was available to them.

The food that they would have eaten would comprise of plants such as roots, leaves, fruits, nuts and seeds and meat from whatever animals they could catch.

They would have used tools and weapons made from wood and stone to gather and hunt for food, hence this period in time being called the Stone Age.

After the Ice Age, which ended about 11,000 BC, humans started to lead a more settled life. Instead of eating all of the seeds that they collected, some were kept and planted so that they could be cultivated and eaten in the next season. This could be repeated year after year, enabling a more controllable source of food. The same method was applied to animals. Instead of killing every animal that was caught, some animals were kept to provide milk and also to provide offspring. This was the beginning of the domestication of plants and animals.

To be able to grow food in this way meant that Stone Age people would have to live a more settled life as they needed to stay in one place to grow plants.

As the food at this time was still wild, it would naturally be high in phytoalexins. Therefore Paleolithic people would have received high amounts of phytoalexins in their diet.

## IN SUMMARY

**Ancient man obtained food by hunting animals and gathering fruit and vegetables from the wild**

**The diet would have comprised of meat and fowl, berries, nuts, tubers, roots and grasses**

**These foods would come from a variety of wild sources**

**The fruit and vegetables would naturally be free from agro-chemicals, not cross-bred, nor intensively farmed**

**The fruit and vegetable element of the diet would be naturally high in phytoalexins**

## Farming from the 1700's

Following the domestication of plants and livestock there was little change in farming until around around 1700 when an agricultural revolution took place. "New world" crops such as corn and potatoes were introduced. The use of monocultures started and is still used extensively to this day. Monoculture is the growing of a single variety of crops over a wide area of land.

The sowing of seeds had been mostly carried out by hand and consisted of scattering the seed on the ground. This was inefficient, as a high percentage of seeds did not sprout and grow into crops.

The invention of the seed drill by Jethro Tull changed this. In 1701 Jethro Tull invented a machine that could make holes in the ground, plant seeds and then cover them. Horses pulled this seed drill in straight lines meaning that the sowing of seeds was more efficient and larger areas could be covered in less time.

## Farming from the 1700's cont...

The monoculture crops produced far higher yields and harvesting methods were changed around this time. The scythe and sickle had been used until the first mechanical harvesters were created. The new machinery reduced the time required to harvest a field and reduced labour costs. Later on the harvester was combined with a thresher and hopper and became known as the combine harvester. This machine has fundamentally stayed the same until the present day. One problem with the new machinery was that it did not cope well with irregularly shaped crops. Rather than seeking a mechanical solution, the crops were specifically selected or engineered by cross-breeding such that they would be a uniform shape, size or height.

Unfortunately, the use of a single variety of crop provided a new problem. If one plant in the field was subject to an insect, pest, or fungal attack then the whole field was at risk as all the plants shared the same genetic weakness. The Irish Potato Famine between 1845 and 1849 was a result of the potato being vulnerable to phytophthora infestans. Whole fields of plants were lost in one go, resulting in substantial losses for the farmers, loss of revenues, and to the population deprived of a vital food source, great hardship and loss of life.

### IN SUMMARY

**Up to the 1700's seeds were mostly sown by hand**

**Jethro Tull invented the seed drill that partially automated the process of sowing seeds**

**Agricultural monoculture is the growing of a single variety of crop. Single varieties of grain were grown over wide areas**

**Grains were used that grew at a particular height without bending over so they could be harvested mechanically**

**As there was no natural variety in the species, whole fields were at risk from fungus or insects**

## The 1940's onwards- the use of agro-chemicals

The use of single variety crops has continued up to the present day and one problem of growing a crop of a single variety is that all plants display the same characteristics - good or bad.

Farming in the 1940's saw the development of artificial chemicals to reduce losses and protect crops. A feature of the uniform cultivars is that they make better use of space, but in so doing they have a greater drain on soil nutrients. Artificial fertilizers were used to replace nutrients, increase yields and make crops healthier. Herbicides were used to limit the growth of weeds in fields, fungicides and insecticides were used respectively to prevent crops being attacked and destroyed by fungus and insects. The downside of this, as the majority of people are now aware, is that the artificial chemicals can harm the environment, wildlife, and human beings. Unfortunately, the farmer has little choice other than to use such methods in order to protect his crop monoculture and livelihood. Just as serious, but not really known about until recently, is that the use of pesticides may have negative effects on plants' own natural defence systems.

Resveratrol is a natural constituent found in grapes. It is found mainly in the skins of the grapes and the roots of the plants. The plants produce it as a natural defence against fungal invasion. If the grapevine is not challenged by a fungus the plant has no need to make resveratrol to defend itself. When artificial fungicides are used on the grapes, the fungus has no chance of challenging the plants' natural defence system, nor the plants of producing this important plant chemical as their immune response. Instead, the fungus is kept at bay by the artificial fungicide. Resveratrol is just one of a number of important phytoalexins that may be at reduced levels in the crop as a result of the use of fungicides.

### IN SUMMARY

**Due to the use of single varieties of crops, yields were affected by fungus and insects, wiping out whole fields**

**Herbicides and pesticides are used extensively to protect the crops from high losses**

**These man-made chemicals have been used extensively up to the present day**

**Agro-chemicals often have a negative impact on the eco-system**

**Recent scientific research has found that agro-chemicals also inhibit plants from producing some potentially beneficial phytoalexins**