

# People, Food, Fertilisers

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It seems strange but it is a fact that the human population of the world was static from the time of Christ until after 1000 AD. Indeed there was very little change in the next 500 years either. People were born and had short lives, succumbing to disease and famine, so that a high birth rate did not result in a population increase. It is estimated that up to 50% of children died before the age of 5 years.

There was an increase in World Population after 1500 AD and this was facilitated by the discovery of new territories in the Americas and Australia where food could be grown in abundance to feed extra people.

The discovery of vaccination against disease by Edward Jenner in 1798 was a milestone in population terms. The rapid increase in the human population began after 1800. Thus while it took up to 200,000 years from the first humans (Homo sapiens) for the human population to reach 1 billion (1 thousand million), the population increased by a further 1 billion in 123 years. The most recent billion increase (from 5 to 6) took only 12 years and was reached in 1999.

**Table 1: Population milestones**

<i>Population</i>	<i>Year Reached</i>	<i>Years for 1 billion increase</i>
1 billion	1804	Up to 200,000
2 billion	1927	123
3 billion	1960	33
4 billion	1974	14
5 billion	1987	13
6 billion	1999	12
* 7 billion	2013	14
* 8 billion	2028	15
* 9 billion	2054	26

• Projected

These rapid increases in population put a huge demand on food producers. The world today has six times as many people as it had in 1800 and these

people demand more and different food, especially more meat. It is also expected that world population will increase by a further 3 billion people by 2050.

Meeting a rapidly increasing demand for food can be approached in a number of ways or perhaps by a combination of approaches.

1. the area under crops can be increased
2. the yield per hectare can be increased by a range of actions.

The most dramatic increase in the human population occurred from 1960 to 1999 so it is interesting to examine how the food producers of the world responded. The United Nation Food and Agriculture Organisation has documented the result.

In 1961 we had available per person 2200 calories per day, but by 1998 this had increased to 2800 calories, a rise of 24%

In 1961 protein available amounted to 60 grams person per day. In 1998 this increased to 75 grams a rise of 25% and within this protein supply, the proportion from meat and milk increased from 31.5% to 36.8%. So despite a doubling of population in 40 years, we all had more food and better balanced food at the end.

Did we bring massive extra land areas into use? The answer is no. Agriculture used about the same area of land at the end as at the beginning of the period.

Modern scientific agriculture, supplied two and a half times as many food calories in 1999 as were supplied in 1960 and also two and a half times as much protein. This is a marvelous achievement and it should be remembered that the failure to do so would have resulted in mass starvation, not just in the third world but also in some first world countries.

Three factors represent the major components of these increases in crop yields:

1. Genetic gains - better varieties of crops with higher yield potential.
2. Chemical Fertilisers which provided nutrients to allow the better crops to express their potential
3. The development of pesticides: chemicals which prevented the destruction of crops by fungi, insects and weeds.

The Central Statistics Office has published data from the middle of the nineteenth Century (post famine) which illustrate clearly that the gains in crop yields have all occurred in the second half of the 20<sup>th</sup> century.

Yields of cereals, potatoes and turnips ( the major crops) are given in Table 2 for the periods 1851-55, 1924-28 and 1991-95.

**Table 2 Crop Yields in Ireland since the famine ( tonnes per hectare)**

Years	1851-5	1924-8	1991-5
Wheat	1.75	2.50	7.79
Oats	1.80	2.32	6.61
Barley	2.27	2.46	5.88
Potatoes	13.90	13.90	28.50
Turnips	40.80	43.90	54.10

Source: CSO

The extent to which Fertilisers contribute to these yield increases are shown in data from Oakpark Research Centre.

**Table 3: Yield increase for 100 kg N per hectare**

Barley	88%
Wheat	90%
Sugar Beet	14%
Potatoes	116%

Source: Teagasc Oakpark

To continue to feed over growing World Population, we will need to increase food production by 50% over the next half Century. This is undoubtedly achievable with modern science, but it will not happen without effort and planning. The big gains from the supply of fertiliser are over. Indeed for environmental reasons we may have to accept some cutback in fertiliser use. This has already happened in Ireland and in some other western countries. There is also pressure to keep pesticide use to a minimum. The task then is to design cultivation practices and achieve genetic improvements, that will allow crops use fertiliser more efficiently while increasing yields. In many ways, we in Ireland and over neighbours in Europe are insulated from these world problems. With our ability to produce food for several times our existing population we see only the problems of selling our surplus food. We would do well however to remember that only 50 years ago, Ireland was unable to feed a much smaller population the lives on the Island today.