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New Soil Association report shows GM crops do not yield more - sometimes less

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Coinciding with a manifesto from Country Life launched today, which urges people to 'learn to love GM crops', the Soil Association has published a report on the latest available research on all major GM crop varieties in cultivation are lower than, or at best, equivalent to, yields from non-GM varieties.

Peter Melchett, Soil Association policy director, said:

"GM chemical companies constantly claim they have the answer to world hunger while selling products which have never led to overall increases in production, and which have sometimes becomes scarcer and more expensive, we need to move away from oil dependent GM crops to producing food sustainably, using renewable energy, as is the case with organic farming."

Latest Research on GM Crop Yields

GM crops as a whole

First generation genetic modifications address production conditions (insect and weed control), and are in no way intended to increase the intrinsic yield capacity of the plant.

- An April 2006 report from the United States Department of Agriculture (USDA) states that "currently available GM crops do not increase the yield potential of a hybrid variety. [...] In order to carry the herbicide tolerant or insect-resistant genes are not the highest yielding cultivars". (Fernandez-Cornejo, J. and Caswell, 2006)
- The United Nations Food and Agriculture Organization's 2004 report on agricultural biotechnology acknowledges that GM crops can have reduced yields (FAO, 2004). This is not surprising as genetic modifications address production conditions (insect and weed control), and are not intended to increase the intrinsic yield capacity of the plant.
- A 2003 report published in Science stated that "in the United States and Argentina, average yield effects [of GM crops] are negligible and in some cases even slightly negative". (Quaranta, 2003) authors being strong supporters of GM crops.
- Yields of both GM and conventional varieties vary - sometimes greatly - depending on growing conditions, such as degree of infestation with insects or weeds, weather, region of production.

Roundup Ready (RR) GM soya

Studies from 1999 - 2007 consistently show RR GM soya to yield 4 - 12% lower than conventional varieties.

- A 2007 study by Kansas State University agronomist Dr. Barney Gordon suggests that Roundup Ready soya continues to suffer from a yield drag: RR soya yielded 9% less than a conventional variety.
- A carefully controlled study by University of Nebraska agronomists found that RR soya varieties yielded 6% less than their closest conventional relatives, and 11% less than high yielding conventional varieties. A 6% 'yield drag' was attributed to genetic modification, and corresponds to a substantial loss in production of 202 kg/ha.
- In 1998 several universities carried out a study demonstrating that, on average, RR soy varieties were 4% lower in yield than conventional varieties (Oplinger et al., 1999). These results are contrary (Gianessi, 2000).
- Yields of GM soybeans are especially low under drought conditions. Due to pleiotropic effects (stems splitting under high temperatures and water stress), GM soybeans suffer 25% higher yield loss than conventional varieties (Pengue, 2005)
- 5 studies between 2001 -2007 show that glyphosate applied to Roundup Ready soybeans inhibits the uptake of important nutrients essential to plant health and performance. The result is a yield drag, caused by various problems, from increased disease susceptibility to inhibition of photosynthesis. Thus, the same factors implicated in the GM soya yield drag may also be responsible for increased yield loss under drought conditions (2004; Neumann et al., 2006; King, et al., 2001; Bernards, M.L., 2005; Gordon, B., 2007).
- The yield drag of RR soya is reflected in flat overall soybean yields from 1995 to 2003, the very years in which GM soya adoption went from nil to 81% of U.S. soybean acreage. By 2003, the cost soybean farmers \$1.28 billion in lost revenues from 1995 to 2003 (Ron Eliason, 2004).
- More recent evidence shows that the kilogram per hectare ratio of soybean has been in decline since 2002, leading to the conclusion that RR soy does not have an impact on yield (Agriculture, 2007).

Bt Maize

Only maize shows a persistent trend of yield increase into the biotech era, but even here the rate of increase is no greater after than before biotech varieties were introduced.

- A rigorous, independent study conducted in the U.S. under controlled conditions demonstrated that Bt maize yields anywhere from 12% less to the same as near-isoline (highly similar to conventional varieties).

Bt Cotton

Despite claims of increased yield, Bt cotton has had no significant impact in real terms.

- Average cotton yields have increased 5-fold since 1930, and staged an impressive surge from 1980 to the early 1990s. Cotton yields then went flat, and continued to stagnate during the 1990s. The steep yield and production increases in 2004 and 2005 were chiefly attributable to excellent weather conditions (Meyer et al., 2007).
- Bt cotton, introduced to Australia in 1996, has not offered a boost to the cotton sector, and since its adoption has not provided improvements in either yield, or quality (ISAAA, 2006).
- Cotton South Africa show constant yield levels before and after adoption of Bt cotton (Witt et al 2005, cited in FoEI Who Benefits 2007), in contradiction to ISAAA claims that Bt has increased yields.
- Outbreaks of the secondary pests that are not killed by the Bt insecticide have rendered Bt cotton ineffective in China (Connor, S., July 27, 2006), and are also becoming a problem in India (Hollis, P.L., 2006).
- An article in Nature Biotechnology notes that the poor performance of Bt cotton varieties used in India (which were developed for the short U.S. growing season) is linked to the long growing season, and because Bt cotton insecticide is not expressed in 25% of the cotton bolls of India's preferred hybrid cotton varieties (Jayaraman, K.S., 2005)

During the Government's 2003 'national debate' on whether or not to allow commercial planting of GM crops, the Royal Institute of Chartered Surveyors, which represents land agents and valuers, warned of possible declines in land values if GM crops were planted. **[1]** Recent research in Sweden has confirmed that GM seeds can remain active in farmland for at least 10-years, adding scientific weight to the land values of growing GM crops.

Ends

For media enquiries please contact Clio Turton, Soil Association senior press officer, 0117 914 2448 / cturton@soilassociation.org

Notes to editor:

[1] Extract from an article published in Daily Telegraph: GM crop trials 'pose threat to property prices'

By Charles Clover, Environment Editor (4 June 2003)

Property prices could be undermined if land is polluted with traces of genetically modified crops, the Royal Institution of Chartered Surveyors said yesterday at the start of a Government-sponsored inquiry into commercial GM varieties.

Surveyors and land agents warned of "long-term chaos" in the property market unless buyers were provided with information on the farms, allotments and gardens where GM crops were planted. The RICS said accurate information on where GM crops were planted was essential to buyers wishing to purchase or rent land for non-GM or organic production and to financial institutions.

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