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CROP SCENE

A bi-monthly review reflecting on technical, commercial and policy developments that affect crop production and uses world wide

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March 2014

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COMMODITY CROP PRICE TRENDS

The prices of key commodities in the table are mainly based on FAO monthly average figures.

Details of definitions and sources are given on the web sites:

www.fao.org/es/esc/prices/CIWPQueryServlet.

<http://www.oryza.com/tags/oryza-white-rice-index-wri>

<http://www.indexmundi.com/commodities/?commodity=cotton>

All prices are in US \$ per tonne.

Commodity	November 2013	January 2014	March 2014
Wheat (<i>US soft red</i>)	276	250	285
Corn (<i>US yellow</i>)	200	198	222
Soya (<i>US yellow</i>)	513	516	555
Rice (<i>oryza weighted avge</i>)	390	440	451
Cotton (<i>USDA upland</i>)	1642	1775	1932

Notes: 1. Cotton prices are based on USDA data and calculated from US\$ per lb @ 2200 lb per ton.
2. Historical prices may differ from those quoted in the last issue of Crop Scene based on revised figures from FAO and USDA

Most grain prices had moved upwards since January. Wheat price increases were partly the result of continued dry conditions in the US which has led to further deterioration of the winter wheat crop in several of the major growing states and with little rain forecast. Any shortfall in US production will have an exaggerated impact as US wheat stocks are lower than normal. Forecasters and traders are also watching the Ukrainian political situation because of the potential risks to grain supplies. Projected carryover stocks of wheat in the EU have been reduced following strong export activity. Forecasts for the 2014 crop are however good. The increase in corn prices is partially a reflection of the wheat situation

The soya bean harvest in Brazil is now complete but latest reports from Argentina suggest that previous overall production estimates may be under threat due to lower yields in certain regions caused by excessive humidity and disease pressure

Global cotton prices have increased. In February the USDA announced that world ending stocks are projected to rise, for the fifth consecutive year, to a record 100.5 million bales despite relatively strong growth in consumption and a marginal increase in production. However, nearly half the world's stocks will remain in China's state reserve and effectively off the market.

Uncertainties about the situation in Thailand, the major global rice exporter, are still influencing global prices. However the USDA projects that global rice production will reach 471.5 million tonnes in 2013-14, an increase of 91,000 tonnes over the previous year due to an anticipated record rice production in Southeast Asia.



Breaking new ground with GM legislation in the EU?

A compromise approach to the legislative process for GM crops in the EU, and for EU member states, could at last mean that the region moves forward from its over-cumbersome and negative approach to the technology which goes back to the mid-1990s.

Current production of GM crops in the EU is effectively limited to very small areas of *Bt* maize in Spain. Furthermore, the failure of EU legislators to embrace GM technology has resulted in multinational biotechnology companies such as BASF withdrawing R & D activities to the US.

A proposal put forward by Greece, which holds the current rotating EU Council presidency, appears to have gained support from the majority of member states. The drafted proposal would call for the European Commission (EC) and the European Food Safety Authority (EFSA) to conduct assessments of GM crops.

From these assessments if a particular GM crop was deemed unsafe, no member state could approve its cultivation. However, Tonio Borg, the European commissioner for health, explained that if a crop was considered to be safe member states would be free to either cultivate the crop or decide to ban it on grounds other than environment or health concerns. Reasons could be urban or rural planning or socio-economic impact. In February ministers had failed to reach an agreement over whether to allow the cultivation of GM maize Pioneer 1507 and, under the existing legislative rules, there was deadlock. So the Greek presidency had put forward the compromise proposal in order to break this deadlock.

Although some EU ministers expressed concerns that the move to re-nationalise GM crop decisions would run into difficulties with the WTO, Tonio Borg confirmed that EU legal advisors found the proposal to be legally sound and warned against further delays. He said: "It appears that the majority of member states are in favour that we move on. I think this is the right decision."

In the UK DEFRA secretary Owen Paterson has backed the EU proposal. There is even the possibility that GM maize could be fast-tracked for commercial cultivation in England by 2015.

Commenting on the new EC proposal a Department of Environment, Food and Rural Affairs (DEFRA) spokesman, said: "We want our farmers and consumers to have access to the same economic and environmental advantages that over 18 million farmers in 27 other countries currently haveThe stringent EU safety and environmental assessment all GM crops go through remains the same. This change will only end the political deadlock that has blocked progress on GM cultivations in Europe for 15 years."

Owen Paterson has advocated that the UK should consider a 'go it alone' policy for some time. The case has now been strengthened by the release of a new report commissioned by The Council for Science and Technology, CST, and called for by the prime minister.

The review was carried out by leading plant scientists from Rothamsted Research and the Sainsbury Laboratory and led by Professor Sir David Baulcombe, Cambridge University. The group calls for wants "public good" GM varieties to be grown and tested in the UK, fewer EU restrictions and a new regulatory body established to assess GM crops individually, in a similar way to that adopted in the UK for pharmaceuticals, taking potential benefits into account.

The scientists recommended a new programme of publicly-funded field trials to test 'public good' GM crop varieties, which it calls "PubGM". Professor Jonathan Jones, Sainsbury Laboratory, said: "With PubGM, seed companies, consumers and regulators will be able to decide, based on results of



experiments, whether a GM trait has proved its worth in UK crops under UK conditions." Public good traits could include nutritional enhancement and also 'climate-proofing' properties such as drought or heat resistance.

The CST sponsored report has inevitably led to much publicity. The tabloid newspaper *Daily Mail* argued that all of the scientists behind the report were working closely with multinational biotechnology companies, and wrote that critics described the report as "biased and downright dangerous." It further accused the biotechnology giants and the government of mounting a crude propaganda campaign to overturn public opposition.

By contrast *The Independent*, which historically had run campaigns against the adoption of GM crops, ran an editorial in which it supported the conclusions of the CST report and observed that: "The time has come for Britain to decide for itself whether to forge ahead with GM crops, rather than be left in the sidings with the rest of the EU."

Who would like to guess what area of GM crops will be under production in the UK and the rest of the EU in five years' time?

GM crops in Asia – A new political awakening?

While GM crop production is now routine in both North and South America, Europe and much of Asia has remained bogged down with a lack of political willingness to accept the scientific evidence and permit the crops to be grown. However, there are now signs that things are changing.

In India, apart from the widely adopted GM cotton, there has in effect been a two year moratorium on any new developments. This followed attempts to introduce *Bt* brinjal (eggplant). Then the much publicised claims, which were never substantiated, that the adoption and failure of *Bt* cotton had led to an increase in the number of farmer suicides caused politicians to question the role of GM technology in India.

A series of reports, arguments and counter arguments, ensued until finally in March the Indian government made its intention clear by announcing that it does not have any reservation against transgenic crops provided they are adequately tested.

Agriculture minister, Sharad Pawar, made it clear that the scientific field trials of transgenic crops would now be permitted, commencing over the next few months. He indicated that the Genetics Engineering Appraisal Committee (GEAC), the regulatory body responsible for genetically engineered crops, will soon resume its role thus ending the two-year long break on decision-making process.

Sharad Pawar was reported as saying: "Biotechnology has great potential to improve yields. Government is committed to the use of biotechnology and other new technologies for agriculture development and backs field trials of GM crops provided they go through the 'crop-specific dedicated monitoring protocols system'.

He argued: "In fact, the burden on land is bound to increase. We have to meet the burgeoning demand of food-grains, fruits and vegetables from the limited land base. The only Mantra is, increasing the productivity. The use of biotechnology for this purpose is imperative",

In China the only GM crops registered for use are cotton and papaya. China imports large quantities of feed and foods produced from GM crops, most notably GM soya beans from the US, Brazil and Argentina.

Chinese Minister of Agriculture Han Changfu commented on GM crops during the recent National People's Congress in Beijing. He was reported as saying: "GMOs are good, they help to defend the crops from pests and do not cause any harm. I eat them regularly."



The minister added: "Agricultural technology is a new concept for many people, so it is understandable that they are scared or worried. But it is time that people know and accept this reality."

Critics in China have argued that genetic modification is too invasive and eliminates the nutritional properties of plants and represents a potential risk to consumers. The fears are heightened by the fact that scandals related to food production are 'the order of the day'. Urbanisation, forced expropriation of agricultural land and massive social unrests are also part of the backdrop in China.

Central government is aware of the problem, and concerned that developments could put at risk their hold on power. The issue of food security was even raised by Chinese premier Li Keqiang, when opening the twelfth session of the National People's Congress. He stressed that the primary objective is to ensure food security in China. He said: "We will improve the quality of cultivated land, we will increase the production capacity and will ensure self-sufficiency in cereals. In this way, we will have full control of food supply needed by the 1.3 billion Chinese citizens."

The local reports suggest that, given the need for improved food security and the agriculture minister's statements, the way will now be cleared for the production of GM crops nationwide.



FOOD SECURITY

Impact of climate change on crop productivity – The US starts to take it seriously

Although there are still those in the US who are in denial about the impact of climate change on agriculture, announcements in the last few months from universities and, more significantly from multinational corporations, suggest that there is new interest as well as potential business opportunities.

Regional variations

In a previous issue of *Crop Scene* (December 2011), it was reported that the impact of climate change in North America will result in increased temperatures overall, but that the changes will not be uniform. The southern US is expected to warm more than the upper portions of North America.

Dr Tim Griffin is associate professor and director of the Agriculture, Food and Environment programme, at the Friedman School of Nutrition Science and Policy, Tufts University, Massachusetts. His research team have studied how climate change could indirectly affect the ability of the 12 states of the north east US to deliver sufficient food for the high population region. (Timothy Griffin et al. Regional self-reliance of the Northeast food system. *Renewable Agriculture and Food Systems*, 2014; 1DOI: 10.1017/S1742170514000027)

Tim Griffin observed: "...most of the country's pork products come from Iowa and North Carolina, and most of the lettuce is grown in California's Salinas Valley. Looking ahead, there is the potential for climate change to disrupt food production in those key areas. If irrigation in the Central Valley of California was reduced due to climate change, could other regions make up for that drop in production? And what is the capacity of the north east region to produce more?"

Although the north east produces about as much fluid milk as it consumes and about 70% of the amount of eggs consumed, the region produces only 26% of its vegetable requirements and 18% of the fruit consumed. The vegetable crops that are grown are mainly starchy crops such as potatoes and sweet corn. With fruit the region is quite self-reliant for berries such as blueberries and cranberries, but not for apples.

The research team believe that two other factors: population growth and dietary choice, will put pressure on the region to be self-reliant. It is estimated that there will be an additional two million people living in the north east by 2030 (an increase of about 3%). Furthermore federal dietary guidelines which emphasise fruits, vegetables and low-fat dairy products, if followed, would add to the pressure.

Mr Griffin indicated that future research will look at the complex interactions between soil suitability, climate, land use, and infrastructure and explore the policy barriers to agricultural expansion and the incentives that can be provided to address them.

This approach of how climate change in one region will impact on the requirements elsewhere in the US mirrors very much what is likely to happen in other parts of the world. Drought conditions in Spain will limit vegetable and fruit availability for northern Europe.

For the farmer the main challenge set by changing weather patterns is the erratic nature of the changes. For example, anyone living in north west Europe will not have failed to observe the dramatic differences between the extreme cold for the extended period of winter of 2012/13 and the mild weather but continual rain storms of winter 2013/14. For a crop of winter wheat to perform well under both situations is asking a lot.



Enter the multinationals

Two research based multinationals Monsanto and DuPont Pioneer, have independently decided that the variability of climate, regionally and locally, presents the farmer with a need to be better informed. The companies' view is that managing the impact of climate change at farm level, in order to increase crop productivity, will be closely tied to sophisticated analyses of data. Based on the data the companies aim to deliver farmers will be better informed on the choice of seeds, when and how to plant and how to manage other inputs.

Both of the initiatives are specific to the US, so far, and are still evolving. In October 2013, Monsanto announced that it had acquired the weather data company, The Climate Corporation, for \$930 million. The Climate Corporation's proprietary technology is based on local weather monitoring, agronomic data modelling and high resolution weather simulations. The service to farmers, www.climate.com, helps them to make better operating and financing decisions. Climate Corporation also offers *Total Weather Insurance* for farmers, which pays out when bad weather affects farm profitability. It is also an authorised provider of the federal crop insurance programme.

Climate Corporation CEO, David Friedberg, at the time of the announcement said: "A farmer will buy seed that is optimally suited to his land ... and our service will help him make a decision about when to plant, how much nitrogen to put down, when to harvest, what the expected yield is each day,"

Monsanto consider that the combined capabilities will expand the near and long-term growth opportunities of the Integrated Farming Systems and the R & D pipeline. In the longer term the company is looking to offer products beyond the existing row crop and vegetable portfolio in the US and globally.

At the end of February DuPont Pioneer released details of plans to set up a new service under the name *Encirca*. The "whole-farm decision" service will be offered to farmers in the corn and soya bean production areas of the mid-west. Delivery of the data and technology services will be through a dedicated website and a team of about 50 *Encirca* sales and service agents.

The service follows a series of collaborations signed up with various information and technology partners. A three-year agreement with the University of Missouri and the USDA Agricultural Research Services is in place covering the collection of soil, topography and watershed data.

In early February DuPont announced a deal with DTN/The Progressive Farmer to provide weather and market information to farmers, along with new grain trading capabilities, accessed through mobile devices. Last November, DuPont set up a deal with Deere & Co to provide farmers a wireless transfer system for their data. Joe Foresman, DuPont Pioneer Director of Decision Services, said: "There is definitely pent-up demand," and expects the *Encirca* offerings to have a material impact on company revenues.

EncircaSM View available from March will provide farmers with a free information site on crop observations as well as a fee-based programme that includes market news and analysis, grain trading capabilities and locally specific weather forecasts. The fee will be \$150 a month plus an initial set-up fee of \$450. In July, DuPont Pioneer plans to release *EncircaSM Yield*, also a fee-based offering that will help growers assess specific decisions on seeding, chemical applications and water usage.

By contrast with these US activities Syngenta is addressing climate change in agriculture sector in the developing world through the Syngenta Foundation for Sustainable Agriculture. Finding ways to grow more from less, and in particular maximising water use efficiency is a top priority for the company.



Too much reliance on too few crops

Over the last 50 years human diets around the world have moved towards greater uniformity and this in turn means greater uniformity and less diversity in the crops that are grown. A comprehensive new study of global food supplies carried out by an international group of scientists confirms and documents for the first time the trends that have occurred since 1961. The trend to uniformity shows no sign of slowing, with major consequences for human nutrition and global food security. The study led by scientists at the Colombian based International Centre for Tropical Agriculture (CIAT) also involved the Global Crop Diversity Trust, researchers from Wageningen University in The Netherlands and the University of British Columbia in Canada (Khoury et al. 2014. *Proc. Natl. Acad. Sci. USA*).

The study called on data from FAO and looked at information from more than 50 crops and in 150 countries, representing 98% of global population, for the period 1961 to 2009. The group of scientists confirmed that in addition to the dominant crops such as wheat, rice, maize and potato, which were already important half a century ago, the emerging trend has seen the more recent rise in consumption of energy-dense vegetable proteins and oils derived from soya beans, sunflower and palm. Data shows that wheat is a major staple in 97% of countries with rice in 91%. Soya bean has become significant to 74% of the countries.

Luigi Guarino, was a co-author of the study and is a senior scientist at the Global Crop Diversity Trust, which has headquarters in Germany. He said: "Another danger of a more homogeneous global food basket is that it makes agriculture more vulnerable to major threats like drought, insect pests and diseases, which are likely to become worse in many parts of the world as a result of climate change....As the global population rises and the pressure increases on our global food system, so does our dependence on the global crops and production systems that feed us. The price of failure of any of these crops will become very high."



Many crops of considerable regional importance, including the cereal crops sorghum, millets and rye, as well as root crops such as sweet potato, cassava and yam, have declined in importance.

One example reported is the nutritious tuber crop known as oca, *Oxalis tuberosa*, once grown widely in the Andean highlands of Peru and Bolivia. Both cultivation and consumption of oca has now declined significantly in the region

Colin Khoury, lead author of the study in commenting about the dominance of the few staple crops said: "These foods are critical for combating world hunger, but relying on a global diet of such limited diversity obligates us to bolster the nutritional quality of the major crops, as consumption OF OTHER nutritious grains and vegetables declines." *Oca – Andean root crop*

A number of factors are causing dietary change. For example, rising incomes in developing countries, have enabled more consumers to include larger quantities of animal products, oils and sugars in their diets. Colin Khoury noted the problems that these changes can cause: "Countries experiencing rapid dietary change are also quickly seeing rises in the associated diseases of overabundance.... But hopeful trends are also apparent, as in Northern Europe, where evidence suggests that consumers are tending to buy more cereals and vegetables and less meat, oil and sugar."

A five point action plan was proposed by the scientists:

- Actively promote the adoption of a wider range of varieties of the major crops worldwide to boost genetic diversity; thus reducing the vulnerability of the global food system in the face of challenges from climate change, rising food demand, water and land scarcity. The banana crop is a good example as it is dominated by few commercial varieties.



- Support the conservation and use of diverse plant genetic resources—including farmers' traditional varieties and wild species related to crops—critical for broadening the genetic diversity of the major crops. The need is to implement better safeguarding and sharing of these genetic resources internationally and to increase investment in crop breeding.
- Enhance the nutritional quality of the major crops on which people depend. For example, by breeding varieties with improved micronutrient content such as iron and zinc.
- Promote alternative crops that can boost the resilience of farming regionally and improve human diets. Their use can be increased through raising awareness and the policies.
- Foster public awareness of the need for healthier diets, based on better decisions about what and how much we eat as well as the forms in which we consume food.



▼ R & D PROGRAMMES

Robotic Agriculture – by 2050 or maybe before

Precision Agriculture, since its introduction in the mid 1990s, has tended to settle on variable application of crop nutrients and now quite widely GPS guided auto steering. Engineering, electronics and satellite technologies still have much to offer agriculture, so one day it can be expected that robotics in crop production will appear on the scene. Whether it will be in the first half of this century time will tell. At a recent conference organised by the British Beet Research Organisation, Professor Simon Blackmore, director of the National Centre for Precision Farming, Harper Adams University described some of the drivers behind technical developments and the possibilities for the future.

The trend in the size of equipment in Europe, for cultivation and harvesting, is to be bigger and bigger. Driver costs are getting higher so a doubling of the work rate keeps down operating costs. Weather trends are leading to smaller working windows and the need for larger tractors. Simon Blackmore explained that while large machines are good for large fields the maximum practical size is close to being achieved. For example in the UK transporting combine harvesters through railway tunnels is an issue. So a question is whether big is always good and whether high yields necessarily mean the highest profit.

Large horsepower equipment also means heavier equipment and excessive weight is the cause of soil compaction. It is estimated that around 90% of energy used in cultivation work is needed to repair damage caused by machines. Ideally the soil is best left alone.

One way round the problem of compaction is to adopt better traffic management. By far the most compaction is caused by tyres from random vehicle movement. So by adopting GPS controlled traffic management it is estimated that savings of 10-15% in fuel, time and inputs can be achieved. Also with smaller low ground pressure tractors the working window for cultivation work is enhanced contrary to the trend for large farms to operate with fewer larger tractors.



There is a case for the use of robotics in most of the field activities: crop establishment, crop scouting, crop care and selective harvesting. For cultivation and establishment work it would be possible to replace the heavy draught tractors and opt for vertical micro tillage. Through robotics it would be possible to plant in the same place each year, not cultivate the whole top soil and vary the depth of seeding to optimise moisture availability.

Low ground pressure robotic tractors for micro tillage (copyright 2008 AGCO)



For scouting work on growing crops there are a number of ways in which automatic instruments can be used by agronomists to give real-time data over the whole farm. Unmanned ground vehicles can be used to scout and record agronomic measurements, as well as for use in crop trials. Unmanned aerial vehicles (UAVs) offer the potential for rapid assessment and high resolution imagery to record crop density, weed patches and many other variables in the field. UAVs are already available commercially for use in agriculture.

UAV used for crop monitoring



The development of robotics in managing crops while they are growing will follow. Simon Blackmore described some experimental work carried out in Denmark. For fungicide application it is feasible to develop a mobile machine with the capability of visually recognising the leaves of the crop plant in real time and recording its position. A microdot sprayer can then deposit chemical only on the leaf of the plant saving 99.99% by volume. Machine vision can also be considered for weed control. By recognising and recording the growing point of the weed a follow up laser kills the weed by heating the growing point.

Robotic selective harvesting is an area which could pay dividends for high value crops. With many crops such as lettuce up to 60% of the harvested crop is not of saleable quality. So the need is to only harvest that part of the crop which is 100% saleable. Phased harvesting would then be possible. Assessment of the quality and quantity of crops before they are



Selective picking with a robotic harvester
(copyright 2008 AGCO)



harvested could be automated which would enable grading, sorting and packing at the point of harvest and would minimise the need for off-farm grading and sorting.

Although the practical adoption of robotics is still some way off. Prototype driverless tractors have been made and exhibited by Deere & Co.



John Deere driverless tractor

Simon Blackmore says that all of these concepts have been developed and initially researched. The fact that few are commercially available is a result of lack of demand. If the economics along the food chain changes some examples of robotics could be in use before 2050.

Protecting minor crops in the Prairies

An increasing problem in the EU is how to make minor crops viable as more and more crop protection products get withdrawn and the cost of maintaining registration is too high to justify. It appears that a similar problem exists in Canada, not so much because of product withdrawals but, due to the fact that small acreage crops get overlooked by the multinational companies when such vast areas of cereals and canola are available on which to apply their chemical and genetic technologies.

The Prairie Pesticide Minor Use Consortium (PPMUC) was formed in 2000 to facilitate the registration of pest management products for those crops and commodities that its members produce. The consortium members are representatives from commodity producer and supply industry organisations.

In the Canadian Prairie Provinces a number of pesticides and fungicides that can be used on wheat, for example, are not available for more minor crops like peas, lentils, forages or for greenhouse crops.



This is the case even though the area of the crop that is considered minor in Canada, such as peas, would be classed as a major crop in many EU countries.

The problem is that many agrochemical companies do not always bother to include small crops on their labels. At a recent meeting in Lethbridge, Alberta, Blair Roth, PPMUC chairman, highlighted some of the problems. He said: "We need to compete with the rest of the world, as they are using these pesticides." He explained that the process already exists to be able to apply to the Canadian Pest Management Regulatory Agency, PMRA, so that labels can be extended to small acre crops.

Blair Roth also quoted some successes. Some fungicides that are used on canola can now be used on smaller crops. He said: "For dry beans, where *sclerotinia* is a concern, it is also a concern on canola. We can roll some of those products into dry beans as a registered use through the minor use programme."

Ron Pidskalny, PPMUC's minor use procurement officer, explained how recent transitions in the 60 year old agrochemical industry and the advent of crop biotechnology are adding to the problems for minor crops. He said: "We have a flurry of active ingredients that were registered in the 1960's and 1970's. Those have since trailed off and we have seen a lot of the generics move in as the patents expired. We have also seen biotechnology take over and we have seen the transition of value capture on the herbicide move to the seed."

Rod Pidskalny explained how generic agrochemical manufacturers operate to a lower cost structure and spend less on R & D. The implication being that, new products covering minor crops will be even more difficult to find. He quoted a cost of about \$260 million to develop a new active ingredient.

He added that the large multinational research based corporations are capturing value through biotechnology and feeding that back into R&D. But so far this is all aimed at the major crops. A more positive message offered was on the possibilities with many new biologicals and innovations which when combined with traditional technology will give farmers more options. Biologicals, particularly in greenhouses, can be expected to be of immense value for minor and specialised crops. Rod Pidskalny gave an example. He said: "You can actually put the pest control product, which is a biological organism, on to the bee. The bee takes it into the greenhouse and moves it around and gets the pathogen on to the pest."

He challenged growers of minor crops to become a lot more technologically astute and see where they are going to be able to mesh the value of these biologicals with the traditional products in their operations.



▼ BIO FUELS AND ENERGY CROPS

New industrial, biomass and food opportunities for hemp

Scientists from York University have reported on the development of hemp crops which have a fatty acid content similar to that of olive oil as well as possessing a longer shelf life and greater heat tolerance. The scientists conclude that the high oleic acid varieties can be a major step towards developing hemp as a commercially attractive break crop for cereal farmers in Europe

(M Bielecka et al. *Plant Biotechnology Journal*, published on line 10 Feb 2014, DOI: 10.1111/pbi.12167).

Hemp is a low-input crop and is also dual purpose. Hemp straw is used as a fibre (for bedding, composites, and textiles), for biomass energy and as a source of high value waxes and secondary metabolites.

Using fast-track molecular plant breeding, the scientists selected hemp plants lacking the active form of an enzyme involved in making polyunsaturated fatty acids. The selected plants made less polyunsaturated fatty acids and instead accumulated higher levels of the monounsaturated oleic acid. A field trial in Yorkshire with the new line confirmed the higher oleic acid content at almost 80% compared with less than 10% in a standard hemp line.



This oil from the new line was shown to have around five times the stability of standard hemp oil, making it more valuable as a cooking oil and opening up opportunities for its use in high temperature industrial processes.

High oleic hemp oil and hemp seeds. (University of York)

Professor Ian Graham, University of York, biology department said: “The new line represents a major improvement in hemp as an oil cropSimilar developments in soya bean and oilseed rape have opened up new markets for these crops, due to the perceived healthiness and increased stability of their oil.”

An improved hemp crop which yields high quality oil would also provide an excellent alternative break crop to oilseed rape in the UK.

In 2014, field trials of the new “high oleic hemp” are planned across Europe in order to establish agronomic performance and yield under a range of conditions in advance of launching a commercial crop.

There is also the possibility that the hemp crop could be developed for industrial markets in the US where until now it has not been permitted, due to its association with marijuana. However, a ruling under the Farm Bill, which came into law in February, colleges and universities may be permitted to grow the



crop for research purposes. As soon as new federal regulations on industrial hemp are issued by the Department of Agriculture, state universities will be able to explore possibilities with the crop. The provision, which was originally introduced as an amendment by Colorado representative Jared Polis, defines hemp as separate from marijuana, and could give the fledgling industry the scientific boost it needs.

Eric Steenstra, president of the national advocacy organisation Vote Hemp, says the provision will allow researchers to begin the work of rebuilding the hemp industry. Fifty years have passed since the last crop was grown commercially in the US. Mr Steenstra said: "All of the genetics we had from centuries of growing hemp have been lost in the last fifty years and we need to find varieties that are going to grow well in different parts of the country and that will meet the needs of manufacturers."

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