

## **Wine growing regions trial genetically modified wine grapes**

### **Market place will reject GM wine**

#### Summary

1. Recent research by Greenpeace USA has revealed that trials are being conducted in the USA, principally in California, with GM wine grapes. The UK is the largest market for Californian wine (30%).
2. However GM grape releases are not confined to the US; trials have also been conducted in other major wine producing countries. The four leading wine exporters, France, Australia, Italy and Germany, which together account for over 60% of sales in the UK, are all carrying out trials of GM vines.
3. Greenpeace has conducted a survey of leading wine retailers in the UK asking them whether they would sell GM wine. The retailers all say that they do not support the use of the technology and will not stock GM wines.
4. Wine producers, particularly those in the Burgundy region of France, are concerned that the quality of wines produced from GM vines will be inferior to current vine varieties, and that there will be loss of diversity of grapes and typicity of the wines produced. The market for organic wine is increasing rapidly, the organic wine industry which is growing to meet that demand is threatened by GM grapes because of the dangers of contamination through cross pollination.
5. A proposed EU Council directive "on the marketing of material for the vegetative propagation of the vine" which would have set rules for the approval of GM vines to be commercially cultivated in the EU was recently sent back to the EU Council technical committee (COREPER) for redrafting, by the EU Ministers of Agriculture. There is currently no date set for its reconsideration by the Council.
6. The majority of the GM traits introduced into the grapevines currently in trials aim to reduce pesticide use on wine grape crops. Alternative methods to improve vine pest resistance are available, for example marker assisted breeding, where the benefits of molecular biology are gained without the long-term environmental and human health risks associated with genetic engineering, not to mention the threat to wine quality and valuable export markets.

## Introduction

Genetically modified (GM) soya, maize, potato and tomato are just the beginning for the biotechnology industry. Ignoring consumer concerns and environmental risks the development of GM food crops continues apace. Recent research by Greenpeace USA has revealed that trials are being conducted in the USA, principally in California, with GM wine grapes. The UK is the largest market for Californian wine. Currently around 30% of Californian wine, worth approximately \$112,000,000 per year, is exported to the UK.<sup>1</sup>

However GM grape releases are not just confined to the US; trials have also been conducted in other major wine producing countries including France, Germany, Italy and Australia.<sup>2</sup>

## The UK wine market

The UK wine market is currently growing at around 5% per year, with consumption of around 16 litres per person per year.<sup>3</sup> France is the leading exporter of wine to the UK, with 25% of the market. The four leading exporters, France, Australia, Italy and Germany, together account for over 60% of sales in the UK. All are carrying out trials of GM vines. If the biotechnology industry has its way, UK wine drinkers can expect a GM future

<u>Share of the UK wine market</u>	
	%
share by value	
France	25.0%
Australia	14.5%
Italy	13.0%
Germany	11.0%
Spain	7.7%
South Africa	6.3%
USA	6.0%
Chile	5.6%
Argentina	1.6%
(from The Grocer, wine supplement, 12.8.00)	

<sup>1</sup> California department of food and agriculture 2000 – Major Californian agricultural exports to each of the top 10 destinations, 1997 figures. [www.cdfa.gov/statistics/top\\_ten/index.htm](http://www.cdfa.gov/statistics/top_ten/index.htm)

<sup>2</sup> Information on European GMO releases from <http://food.jrc.it/gmo/gmo.asp>.

<sup>3</sup> From The Grocer, Wine supplement, 12.08.00

## Market Rejection of GM crops

There has been a comprehensive rejection of GM crops in the food sector throughout the UK and Europe. Every major food manufacturer and supermarket in Europe has removed GM ingredients from their food products. Many have also committed to removing GM from the diet of animals that provide meat and dairy products. These include the fast food outlets McDonalds and Burger King as well as major supermarket chains such as Carrefour, Tesco and ASDA.

As a consequence the US grain export market (which does not currently segregate GM and non-GM grains) has been shrinking. US soya exports to Europe dropped from 9, 849,257 metric tonnes in 1995 to 6,751,055 tonnes in 1999.<sup>4</sup> US corn exports to Europe have also dropped from 2 million tons in 1998 to 137,000 tons in 1999. Altogether loss of export markets for US grains from 1998-1999 has been estimated at nearly \$1 billion.<sup>5</sup>

## No market exists for GM wine

At the end of last year Greenpeace conducted a survey of leading wine retailers in the UK asking them whether they would sell GM wine. The results, perhaps not surprisingly, showed a clear rejection of the technology and should send a stark message to grape growers in California and elsewhere.

### Leading wine retailers positions on sale of GM wine

Retailer	Market Share 1999	Retailer's Responses
<u>Supermarkets</u>		
Tesco	18.0%	will not stock GM Wine
Sainsbury's	15.6%	will not stock GM food or drink.
Asda Stores	7.7%	no response
Safeway	7.6%	will not stock GM wine.
Somerfield / KwikSave	5.6%	will not sell GM foods or drinks.
Total Co-operative stores	3.5%	CWS will not stock GM wine
Morrisons	2.5%	would not buy GM wine.
Waitrose	2.1%	would not stock GM wine.
M & S	1.7%	no current plans to sell GM wine.
Other grocery/convenience	<u>11.7%</u>	not contacted
Total	76%	

<sup>4</sup> soya and oilseed bluebook 2001 - [www.soyatech.com](http://www.soyatech.com)

<sup>5</sup> Halweil, Brian. 2000. Portrait of an industry in trouble. Worldwatch news brief. <http://www.worldwatch.org> [Feb 19, 2000]; Yerkey, Gary. 2000. U.S., EU agree to pursue high-level talks on biotech trade as new group is set up. *Bureau of National Affairs* 17 (23): 886, June 8.

Specialist Wine Retailers

Thresher/Victoria Wine (owned by First Quench)	12%	will not buy GM wine
Wine Cellar (owned by Parisa)	1.8%	would not stock GM wine
Oddbins	1.6%	would not buy GM wine.
Unwins	0.9%	No response
Majestic	1.2%	would not purchase GM wine.
Other specialist off-licences	<u>3.4%</u>	not contacted
Total	20.9%	

Information on Market Share of Wine Retailing, 1999 from Mintel, Retail Intelligence, July 2000

Selected quotes from Greenpeace survey (Full statements available from Greenpeace)

**Supermarkets**

- CWS "it is not our intention to market any such wines should they reach the market" (November 2000)
- Marks and Spencer "we have no current plans to sell a wine made from genetically engineered grapes" (October 2000)
- Safeway "We would refuse to have wines stocked by Safeway made from genetically modified grapes" (October 2000)
- Somerfield "We do not support this development" (October 2000)
- Tesco "We do not differentiate between wine and food in our policy, it is clear we will not accept GM in either." (December 2000)
- Waitrose "With respect to the California grapes, I can assure you that we have no plans to use them or indeed sell any wines that have been grown using such technology" (October 2000)

**Wine Retailers**

- Majestic Wines "if...wine was made with genetically modified grapes it would not be purchased by Majestic" (October 2000)
- Oddbins "As a matter of policy, Oddbins asks its suppliers to confirm that their wine does not contain any genetically modified grapes" (November 2000)
- Peckhams Wines "we would not even consider buying any wine made from GM grapes or any other GM ingredient." (October 2000)

- Thresher/Victoria Wine "if wine of this nature did become available, we would NOT consider buying it." (December 2000)

Given such rejection it is hard to believe that the biotechnology industry can seriously be suggesting to the wine sector that development of GM vines will bring economic benefit.

### **GM grape research - the current state of play**

In the USA more than 30 consents have been granted for field trials of GM grapes, in the states of California, New York and Washington. These releases have in some instances been approved to continue until 2010.<sup>6</sup> Research on GM vines at Cornell University, New York includes work with Chardonnay, Merlot and other grape varieties modified to be resistant to powdery mildew and *Botrytis cinerea*. Researchers at Dry Creek Laboratories, California have inserted a gene from the snowdrop into grapevine rootstocks to protect against sap-sucking insects and nematodes. However, Andrew Walker of the University of California, Davis says that demonstrating that the snowdrop gene is effective against pests will take years<sup>7</sup>.

Australia is also looking at the development of GM grape varieties – scientists from the Australian government's Scientific and Industrial Research Organisation, CSIRO, are investigating the possibilities of creating "grapes with enhanced flavour, improved colour development and increased disease resistance".<sup>8</sup> Field trials of the modified grapevines are underway but Australian researchers believe that commercialisation of GM grapes is at least 10 years away.

Dr Simon Robinson program director at the Australian Cooperative Research Centre for Viticulture is aware of the problem of consumer acceptance of GM wines and warns:

"Consumers the world over expect wine to have a strong connection with nature and regionality, which adds to the total experience and enjoyment of the product. There is no point producing a brilliant genetically modified wine if no one is willing to buy it. It will be up to the producers, and, ultimately, consumers whether such wines ever appear on the shelves." <sup>9</sup>

In Southern Ontario, Canada a wine producer in collaboration with researchers at the University of Guelph has developed vines with greater resistance to the cold (between 3-5 degrees Celsius). These vines were planted out in field trials in 1997.<sup>10</sup>

<sup>6</sup> <http://www.nbiap.vt.edu/index.html> US GM field test releases.

<sup>7</sup> Coghlan, Andy, New Scientist, Altered vines turn the worm, Jan 4 1997

<sup>8</sup> [http://genetech.csiro.au/research/crops\\_fruit\\_pastures/designer\\_grapevines\\_short.htm](http://genetech.csiro.au/research/crops_fruit_pastures/designer_grapevines_short.htm)

<sup>9</sup> <http://www.innovateaustralia.com/summer00/csiro.wine.html>

<sup>10</sup> <http://www.gftc.ca/articles/2000/gmo.htm>

In Europe, field trials of GM grapes have taken place in Germany, France and Italy, but no GM vine or wine has yet received EU marketing authorisation. A proposed Council directive "on the marketing of material for the vegetative propagation of the vine" which would have set rules for the approval of GM vines to be commercially cultivated in the EU was recently sent back, to the EU Council technical section COREPER for redrafting, by the EU Ministers of Agriculture.<sup>11</sup> The Italian Minister of Agriculture was very persuasive in the debate, asking whether the Commission had made any assessment of the economic impact of the directive on the wine market? They had not and the majority of Ministers supported the Italians' call for a redrafting of the directive.

A number of GM grapevine trials are being carried out in France by the government research organisation INRA (National Institute for Agronomic Research) on a number of grape varieties which have been genetically modified to be resistant to grapevine fanleaf nepovirus. In one of these trials, INRA was collaborating with Moët and Chandon. According to Moët and Chandon, its researchers had been working on a Chardonnay grape cultivar modified to resist grapevine fanleaf nepovirus which is now ready for field testing. Moët says that it decided to stop all research in this field and dug up the vines in July 1999, 'in view of debates led by experts and the possible risks posed by GMO's'<sup>12</sup>.

Some of the biggest wine houses in Burgundy (including Aubert de Villaine of Domaine de la Romanée-Conti, Dominique Lafon of Domaine de Comtes Lafon, Christophe Roumier of Domaine Georges Roumier and Frederic Mugnier of Domaine Jacques-Federic Mugnier) have called for a 10 year moratorium on the commercialisation of GM vines. The producers have also called for increased state research into alternative (non- GM) solutions into the pest problems faced by winegrowers.<sup>13</sup>

The Institut National de Appellations d'Origine which supervises the Appellation d'Origine Controlée (AOC) specifications of French wines currently forbids any modified grape varieties and rootstocks to be used in AOC vines and wines.

Trials of GM vines began at two locations in Germany: Siebeldingen (Rheinland-Pfalz) and Wuerzburg (Bavaria) in 1999, they are due to continue for 10 years. The grape varieties in the trials are Rie sling, Seyval Blanc and Dornfelder. The vines have been modified to be resistant to mildews caused by *Plasmopara viticola* and *Unicinula necator*. The vines also contain an antibiotic resistance gene.<sup>14</sup> These trials with GM vines are solely for scientific purposes and are not meant to produce wines for consumers.<sup>15</sup> This wine cannot be marketed without EU approval.

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<sup>11</sup> text of the draft directive can be found at [http://europa.eu.int/eur-lex/en/com/dat/2000/en\\_500PC0059.html](http://europa.eu.int/eur-lex/en/com/dat/2000/en_500PC0059.html)

<sup>12</sup> letter Moët & Chandon to Greenpeace UK, 28.3.2001

<sup>13</sup> <http://www.drouhin.com/ste/vign/gmo.html>

<sup>14</sup> Meyer Hartmut, Facts on German trials with transgenic vine, GENET

<sup>15</sup> letter Bundesansalt für Zuchtungsforchung an Kulturpflanzen to Greenpeace UK, 25.4.2001

In Italy research is being carried out on GM grapevines at the University of Ancona under a consent issued in 1999. However some wine areas in Italy including the regional councils of Tuscany and Valle d'Aosta have opposed the Directive on GE vines. The Executive Board of the Italian Association of Wine Producing Towns (Associazione Nazionale Città del Vino) and several Town Council members of the association have also opposed the Directive.

In the UK the Wine and Spirit Association have set up a working group on genetic modification whilst Stephen Skelton, Chair of the UK Vineyards Association, believes that GM research could expand the areas open to vine cultivation in Britain and sees GM vines as being "very useful".<sup>16</sup>

### **The Risks of GM crops**

- **Contamination of Conventional and Organic crops**

When wind and insect pollinated GM crops are grown in the environment, pollen from the GM crop will spread and contaminate conventional or organic crops of the same type growing on neighbouring land. When pollen from the GM plant fertilises a non-GM plant, the seed that develops will be genetically modified. Grapevines can be readily cross-pollinated by both wind and insects, and so conventional and organic grape crops could be contaminated by neighbouring GM grapevines.

In 1999 a UK Government funded study accepted that GM crops will 'inevitably' cross pollinate organic crops.<sup>17</sup> Neighbouring farmers' livelihoods may be seriously affected by GM contamination. Organic standards require zero contamination and organic farmers risk losing their certification as organic growers if their crops or land become contaminated. Storage and transportation systems that have not been designed for complete crop segregation are also a potential source of contamination.

These risks cannot currently be insured and neither the government nor the biotechnology industry will accept liability. There are a number of serious contamination incidents, which have already occurred, including the following:

- In 1999, U.S. company, Terra Prima, had to destroy over 87,000 packs of organic tortilla chips (worth over £100,000) which they had exported to Europe, because testing on arrival revealed they were contaminated with GM corn. The resulting loss of sales caused the company to temporarily cease trading. Although the maize was grown on an organic farm in Texas, it was in a region where many farmers were growing GM maize and the suppliers concluded that their organic maize had been contaminated by cross pollination by the GM maize.

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<sup>16</sup> Duffill, Graham and Bodkin Wayne, GMO-Winemakers admit to testing of GM vines, Sunday Times June 27 1999

<sup>17</sup> The John Innes Centre, Organic farming and GeneTransfer from Genetically Modified Crops, June 1999

- In May 2000 contamination was discovered when oil seed rape seed imported into the UK by Dutch seed company Advanta Seeds was found to be contaminated with approximately 1% GM oil seed rape. About 9,000 hectares were sown with the contaminated seed in 1999 and 4,700 hectares in 2000. Advanta believe their seed was contaminated by cross-pollination with Monsanto GM oil seed rape which was growing approximately 400 metres away. Although initially reluctant to take any steps the UK Government, under pressure from the public and the affected farmers, eventually ordered the crops to be destroyed and compensation to be paid to the farmers by Advanta.
- In Autumn 2000 in the US, a variety of GM maize "Starlink" was found in food products despite the fact that it has been prohibited for human consumption, due to concerns about possible allergic reactions. The same variety has also been detected in food in Japan and Canada. More than 300 grocery brands containing maize in the US have been recalled due to contamination concerns. Aventis, the agrochemical company behind Starlink, have agreed to buy the entire 2000 harvest, and all conventional maize grown within 200 metres of the Starlink variety. The final cost is expected to run to billions of dollars<sup>18</sup>

- **Creation of herbicide resistant weeds**

Most of the first generation of GM crops developed by biotechnology companies have been genetically engineered to be resistant to broad spectrum herbicides. Cross-pollination of these GM crops with conventional crops or with related weeds will lead to the production of herbicide tolerant GM volunteers (seeds which survive and then emerge the following year in a different crop grown in the same field) and weeds. In Canada, where GM oilseed rape is being grown commercially on a wide scale, volunteers have been found that are resistant to 3 different types of herbicide.<sup>19</sup>

Government funded research in the UK has confirmed that herbicide resistant GM weeds have been created, even within small trial plots of herbicide resistant GM crops. The researchers conclude that if herbicide resistant GM crops were grown on a large scale "Land could become infested with herbicide tolerant weeds and volunteers to the extent that GM crops could no longer be exploited and conventional crop management would need to be modified."<sup>20</sup>

- **Increased use of pesticides**

Biotechnology companies have developed crops that are resistant to insect pests by incorporation of genes that produce proteins toxic to insects. For

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<sup>18</sup> From Toronto Star, January 9<sup>th</sup> 2001

<sup>19</sup> <http://www.producer.com/articles/20000210/news/20000210news01.html> – Western Producer, February 2000

<sup>20</sup> Botanical and Rotational Implications of Genetically modified Herbicide Tolerance : Progress Report, BRIGHT March 2000



example a number of crops including grapevines in trials in California have been genetically engineered to produce Bt toxin, an insecticide.<sup>21</sup>

The biotechnology industry claims that this type of genetic modification will reduce pesticide use. However, evidence suggests otherwise. Bt corn was introduced in the US in 1995 in order to control the corn borer. However from 1995 to 1998, use of insecticides for corn borer control increased, leading a former director of the National Academy of Sciences Board on Agriculture to note that "clearly Bt corn has not reduced insecticide use, and indeed probably has and will continue to increase it."<sup>22</sup>

Whilst claiming that insect resistant GM crops such as Bt corn will reduce the need for insecticides, agrochemical giants such as Novartis (now part of the Syngenta group) have been busy applying for patents for new combinations of chemicals to spray on Bt crops. According to Walter Smolders, Head of Patents at Novartis " Bt toxin has a rather narrow spectrum of activity, so you don't get control of all pests."<sup>23</sup>

- **Impact on other species**

GM crops can have an unpredictable and undesirable impact on the environment. Laboratory research at Cornell University, published in 'Nature' magazine in spring 1999, showed that monarch butterfly larvae were unexpectedly killed by pollen from GM maize modified to produce Bt insecticide<sup>24</sup>. Further research carried out at Iowa State University in the summer of 1999 confirmed these findings under field conditions.<sup>25</sup>

- **Loss of Local Distinctiveness and Genetic Diversity**

According to the United Nations Food and Agricultural Organisation 75% of the global genetic diversity of our crop plants has been lost during the last century.<sup>26</sup> In Southern Italy between 1950 and 1980 average loss of varieties for cereals was 71% and for vegetables 81%<sup>27</sup>. In Mexico only 20% of local maize varieties reported in 1930 are still known.<sup>28</sup> These losses are likely to be intensified by the introduction of GM technology, which has concentrated on the insertion of new traits into only the most important cash crops.

Similarly with grapes, whilst there are approximately 5-10,000 known grape varieties in the world, only 20-30 varieties are currently used in

<sup>21</sup> Source: United States Department of Agriculture. 2000. Field test releases in the United States. <http://www.nbiap.vt.edu/cfdocs/fieldtests1.cfm>

<sup>22</sup> Benbrook, Charles. 1999. Insecticide use on corn for European corn borer is increasing despite growing use of Bt maize. Correspondence with Greenpeace USA. May 25 2000.

<sup>23</sup> Reported in New Scientist, 18.12.99

<sup>24</sup> John E. Losey, Linda S. Rayor, Maureen E. Carter, Nature, 20<sup>th</sup> May 1999, page 214.

<sup>25</sup> Iowa State University research - Laura C. Hansen Jesse, John J. Obrycki. 2000. Field deposition

of Bt transgenic corn pollen: lethal effects on the monarch butterfly. Oecologia, DOI 10.1007/s004420000502

<sup>26</sup> K. Hammer (1998) Agrarbioidiversitaet und pflanzengenetische Ressourcen. Schriften. ze

<sup>27</sup> ibid

<sup>28</sup> GRAIN (1996) The biotech battle over the golden crop. Seedling 13/3 October 1996

commercial wine production. GM technology is likely to further reduce the genetic diversity of commercially available grape varieties by concentrating on the insertion of new traits into only the most commonly used of the commercial grape varieties. Yet maintaining genetic diversity within agriculture is of fundamental importance, as it helps prevent local crop disease outbreaks becoming regional or national outbreaks.

The wine industry, which thrives on and celebrates the diversity of locally produced grapes, is particularly at risk from the development of GM grape varieties. The wine producers from Burgundy fear that development of GM grapes will bring with it loss of diversity which "is an integral part of our vineyards" and loss of typicity (wines characteristic of their type).

- **Inadequate testing for possible health effects**

As the process for adding new genes to host plants is random, genetic engineers add 'marker' genes so that they can tell which plant cells have been genetically modified. The commonest marker gene used is an antibiotic resistance gene. There is a risk that this gene could be transferred to bacteria in the human gut thereby creating antibiotic resistant pathogenic bacteria. Concerns over the presence of these antibiotic resistance genes led Austria and Luxembourg to ban some varieties of GM crops. Some of the GM grapevines, for example those being tested in Germany contain antibiotic marker genes that confer resistance against kanamycin, and neomycin, antibiotics which are still used in human therapy.

GM food safety is assessed using a risk analysis tool known as substantial equivalence- the idea that by showing that the modified food is chemically similar to its conventional counterpart that it is safe for human consumption. This approach to food safety issues has been much criticised by scientists. The concept is based on a fundamentally flawed argument: that the changes to the genome brought about by genetic engineering are essentially the same as those brought about by conventional breeding. But genetic engineering carries inherent and unique hazards that need to be taken into account in the assessment of the risks of GM products. For example the unpredictability of the genetic engineering process means that there is the potential for the presence of toxic or allergenic novel proteins in GM food products.

Research carried out by Monsanto showed significant differences in fat, carbohydrate and some fatty acids in Monsanto RoundUp Ready soya beans compared to conventional varieties, yet the GM variety was still found to be substantially equivalent to conventional soya.<sup>29</sup> Cows fed on soya meal from RoundUp Ready beans have since been found to have higher levels of fat in their milk.<sup>30</sup> More recently Monsanto has admitted

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<sup>29</sup> Padgett S.R. et al, The Composition of glyphosate tolerant soybean seeds is equivalent to that of conventional soybeans, *J. Nutrition*, 126, 702 (1996)

<sup>30</sup> Widely reported, most recently in Los Angeles Times by Keeler and Lappe, January 7<sup>th</sup> 2000

that RoundUp Ready soya contains extra gene fragments that they were initially unaware of.<sup>31</sup>

Sir John Krebs, Director of the UK Food Standards Agency and chair of an Organisation for Economic Cooperation and Development conference on GM food safety, has called into question the concept of substantial equivalence and says that the current methods for assessing the toxicity and allergenicity of GM foods need re-examination.<sup>32</sup>

### Alternatives to GM vines

Organic vines produce high quality wines, have low chemical usage and encourage biodiversity-rich vineyards with low pest problems. Along with other organic produce, consumer demand for organic wines is increasing. Organic wines currently make up only 1% of the total wine market, but are predicted to account for half of the wine market within 20 years<sup>33</sup>. The majority of organic wines are produced in Northern California and Southern France. Organic wine production is increasing to meet demand with areas of certified grape vines in France increasing by over 30% in 1998.<sup>34</sup> There is however no world-wide standard for organic wines, but where there are national/regional standards they all agree that the wine must be made from organically grown grapes and therefore GM grapes would not be permitted for use in organic wines.

A number of grapevine varieties resistant to fungi have recently been bred in Europe, using conventional methods. Under EU law there is a variety approval scheme which only allows the planting of a classified variety in a particular region. The classification procedure requires five years testing in the region. Several fungi resistant varieties are currently in classification trials in Germany.<sup>35</sup> Regent, the first fungus resistant red grape variety to be classified for wine production in Germany, has been shown to reduce the need for plant protection measures by about 80%.<sup>36</sup>

Other improvements in vines, which could be obtained without recourse to genetic engineering, include research on grafting vines to resistant rootstocks to protect against nematodes and improving grape quality by research on irrigation and canopy management.

A new pest problem has recently reared its head in Californian grape vines; the glassy-winged sharpshooter, which is a carrier of Pierce's disease.<sup>37</sup> Rather than using genetic engineering techniques, researchers are developing resistant varieties of grapes using marker-assisted

<sup>31</sup> The Guardian, May 31<sup>st</sup> 2000

<sup>32</sup> OECD expert urges GM food safety overhaul, ENDS Daily, April 12<sup>th</sup> 2000

<sup>33</sup> Philip Bernstein, Vegetarian Times, May 2000.

<sup>34</sup> Jacques Rousseau, Organic wine production in France-a fast increase, Observatoire Economique 1999 <http://www.landwirtschaft-mlr.bade...rg.de/la/lvwo/kongress/France.html>

<sup>35</sup> Meyer, Hartmut, Facts on German trials with transgenic vine, GENET

<sup>36</sup> letter Bundesansalt fur Zuchtungsforchung an Kulturpflanzen to Greenpeace UK 25.4.2001

<sup>37</sup> California Department of Food and Agriculture. 2000. Glass-winged sharpshooter and Pierce's disease. <http://plant.cdfa.ca.gov/gwss> [June 26, 2000]

breeding, a technique that combines molecular biology with conventional breeding. Marker assisted breeding (sometimes also referred to as 'genomics') is a form of biotechnology which uses genetic fingerprinting techniques to assist plant breeders in matching molecular profiles to the physical properties of the variety. This allows plant breeders to significantly accelerate the speed of natural plant breeding programmes, without exposure to the unpredictable health and environmental risks associated with genetic engineering techniques, as in marker-assisted breeding there is no artificial transfer of genetic material between or within species.

## **Conclusion**

Greenpeace's survey of the leading UK wine retailers indicates that they do not support the use of the technology and do not want to stock GM wines. Many wine producers are also concerned that the quality of wines that may be produced from GM vines will be inferior to current vine varieties.

The majority of the GM traits introduced into the grapevines currently in trials aim to reduce pesticide use on wine grape crops. Greenpeace believes that the modifications may, by encouraging resistance, actually have the opposite effect and increase the use of synthetic pesticides, by increasing reliance on synthetic solutions, encouraging development of resistance within pests and neglecting sustainable pest control techniques.

Alternatives to GM techniques are available, for example marker assisted breeding, where the benefits of molecular biology are gained without the long-term environmental and human health risks associated with genetic engineering, not to mention the threat to wine quality and valuable export markets.

### **Greenpeace believes that:**

- Trials of GM grapevines should end.
- Scientists should focus their energy on continuing to develop non-GM techniques for dealing with vine pests.
- Wine associations and others in the industry should promote research into sustainable solutions to current vine pest problems.

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