

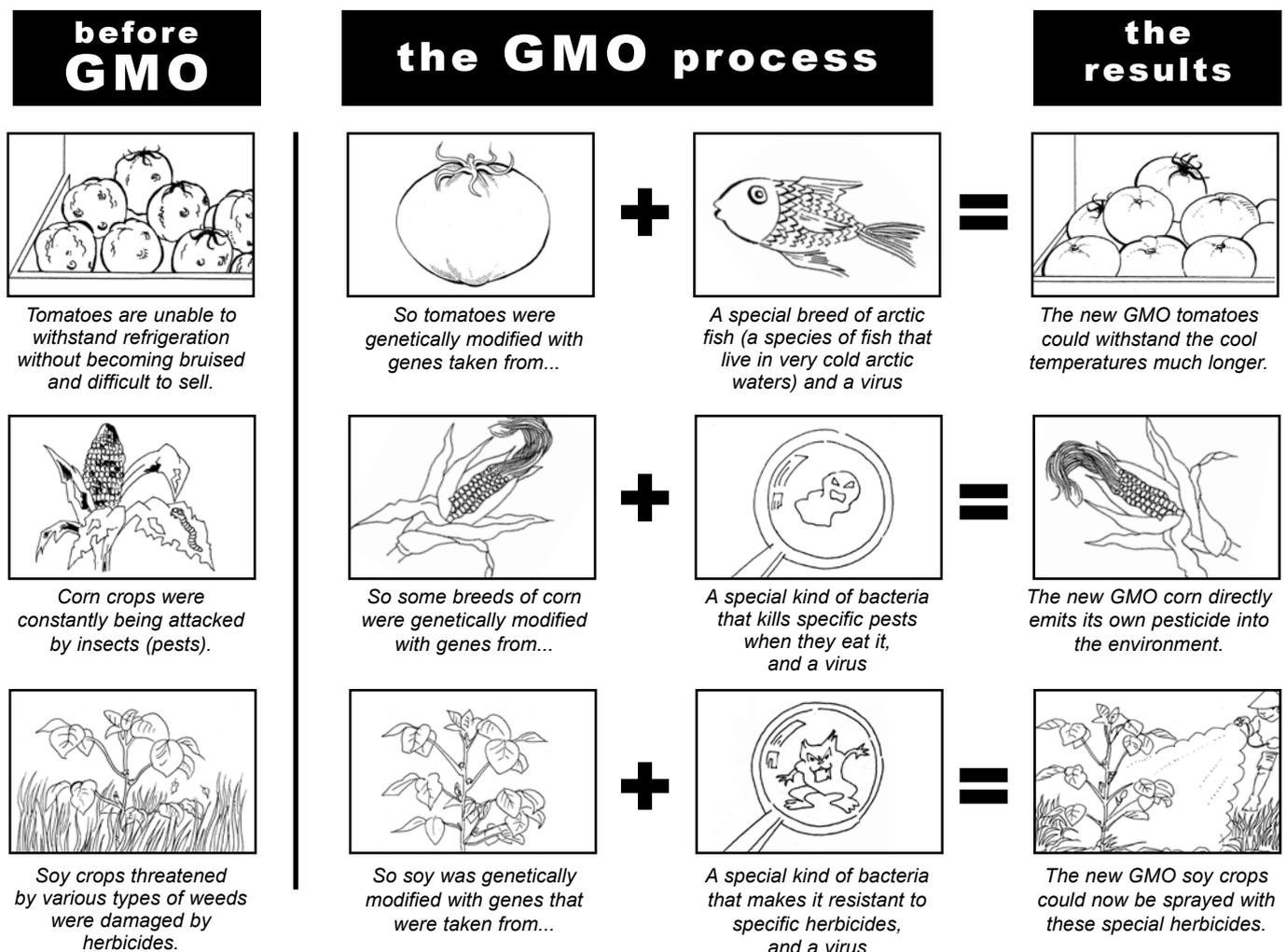
What are GMOs?

A **genetically modified organism (GMO)** is an organism whose genetic material has been altered using **biotechnology** or **genetic engineering (GE)** techniques.

Biotechnology uses plants, animals, or microbes, either wholly or in part, to create or modify a product or change an existing species.

Genetic engineering (GE) is a modern biotechnological process in which the traits or characteristics of an organism are changed by transferring individual genes from one species to another or modifying genes within a species. Other terms for this process are genetically modified (GM), genetically modified organism (GMO), or transgenic.

GMO products include medicines (diagnostic tools and drugs, such as insulin), plants (insect, disease, and herbicide resistant plants), enzymes for food production (cheese), fuels and solvents (ethanol).



The basic principles of how GMOs are made:

GMOs are made by using molecular biology techniques that permit scientists to identify specific genes, make copies of them, and introduce the gene copies into recipient organisms by using a tool (the most common is a soil bacteria called *Agrobacterium*) that inserts genes into plants. When the recipient plant's cells divide, the new DNA from the other organism (carried by the *Agrobacterium*) is copied and passed on to the new cells. These new genes can affect what the plant's offspring can do and even how they look. There are also some other methods used, such as using the "Gene Gun" or the bombardment method.

Let's look at GMO and the possible risks



GMO and agriculture

- Lower yields
- Higher input costs
- Increased use of agrochemicals
- Patent contracts
- Loss of local varieties
- Promotion of unsustainable monoculture crops
- Loss of Bt (*Bacillus thuringiensis*) sprays for organic farmers
- Not enough land to prevent pest resistance



GMO and the environment

- Genetic pollution
- Negative effects on soil ecology
- Super weeds
- Super pests
- New and more dangerous plant viruses
- Impact on nontarget insects and animals
- Loss of Biodiversity
- Negative effects on forest ecology



GMO and consumers

- Toxins and poisons
- Increased cancer risks
- Food allergies
- Damage to food quality and nutrition
- Antibiotic resistance
- Increased pesticide residues



GMO and the economy

- Considered potentially unsafe, some countries are regulating and refusing GMO products, therefore closing down potential export markets for GMO
- GMO-free products could get a better price on international markets
- GMO companies are monopolising the food production system
- Changing the international market for edible oil products



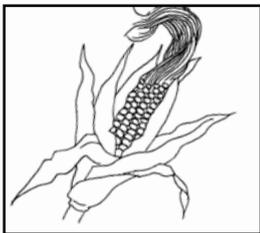
Source: Agriculture Biotechnology, The GMO Debate College of Agriculture & Life Science, Cornell University. www.purefood.org

Two sides of GMO

**GMO crops are both the same and different.
They can't be both. So, what's the real truth?**

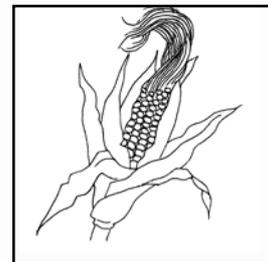
The contradiction arises depending on the situation and who the multinational GMO seed producing companies are talking to at the time. They want GMO crops (and therefore their food products) to be both the same and different for their own financial advantage.

**On 1 hand
they say...**



it's the same!

**On the other
they say...**



it's different!

When talking to regulatory agencies, GMO seed companies say that it is "substantially equivalent" which means it's the same. GMO Corn looks, grows and tastes like a corn plant so it must be treated the same as if it was a corn plant.

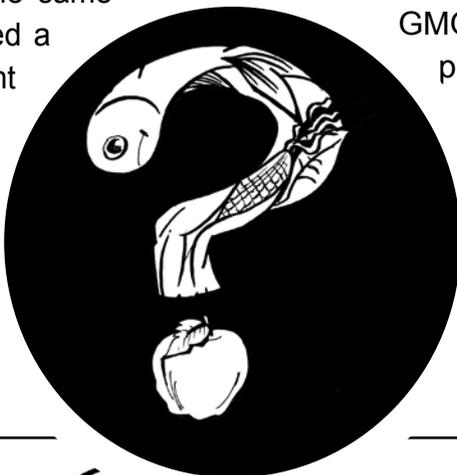
When talking to patenting authorities, the companies say that it is "novel" and therefore different and eligible to be patented. The company then can charge farmers more for its GMO seed because other companies can not produce the same type of seed in the same way.



How profit driven corporations increase their profits with both of these stances...

By sometimes saying that GMO is the same (substantially equivalent) they make money:

By not having to test the health and safety for humans and the environment to the same degree they would if they developed a new product, they save a significant amount of money. By having this status they can market their products faster and have longer to sell the seeds while still under patent because they don't "waste" time to have it properly tested.



By sometimes saying GMO is different (novel) they make money:

By selling their seeds at higher prices than other seeds on the market because GMO seeds have "special" (different) properties. Product patents allow companies to have a monopoly (exclusive rights) on the type of seed they have patented for a 20 year period, including its development time.



The problem with having these 2 stances is...

A handful of GMO companies can make huge profits while the general public and farmers lose in this process. As the seeds aren't properly tested (only a fraction of the time that pesticides are tested) consumers can't be sure that what they are eating is safe. Farmers lose by having to pay higher prices for these patented seeds that have not undergone sufficient environmental testing, which could cause damage in the long term to the environment the farmers live and farm in.

By owning the patents these corporations can...

Control global agriculture systems, charge higher prices for their seed, control who the harvest is sold to, and increase their sales by selling package deals to farmers including seed, fertilizers, and pesticides. They can even sue you if their patented seed genes unknowingly contaminate your crop!

Source: Sylvie Pouteau. *Beyond Substantial Equivalence: Ethical Equivalence*. *Journal of Agricultural & Environmental Ethics* 13: 273-291. Kluwer Academic Publishers. 2000. www.wkap.nl/oasis.htm/274804



This fact sheet was developed by IDEP Foundation

More information: www.idepfoundation.org

Who is profiting from GMO?

GMO (Genetically Modified Organism) crops are plants grown from seeds that have been genetically altered by foreign multinational companies. These companies are promoting GMO seed by saying that they produce better quality and higher quantity of produce, can resist herbicides, insect pests, and viruses, or have some other beneficial aspect for farmers or consumers who use them. If this was true you can see how we could become dependant on these seeds and therefore the food they produce.

The problem is GMO seed and products have numerous potential side effects and until now these products have not been sufficiently tested for human health or environmental effects before being commercially available. The companies that are producing the GMO seeds are the same companies that profited greatly from the Green Revolution, by causing farmers around the world to become dependant on their products. The ironic thing is they are using the same slogans of food security and farmer profits to sell these seeds as they did for their agrochemicals 35 years ago that were proved untrue.

For these companies this is business and the sales and the profits they make from these seeds and the agrochemicals are large (see below for more details).



The top 6 agrochemical companys' sales in 2000



	Agrochemicals	GMO
No 1 - SYNGENTA	\$ 5,888,000,000	\$ 958,000,000
No 2 - MONSANTO	\$ 3,605,000,000	\$ 1,608,000,000
No 3 - DuPONT	\$ 2,027,000,000	\$ 1,838,000,000
No 4 - AVENTIS	\$ 3,480,000,000	\$ 247,000,000
No 5 - B.A.S.F.	\$ 3,336,000,000	
No 6 - Dow CHEMICAL	\$ 2,086,000,000	\$ 185,000,000

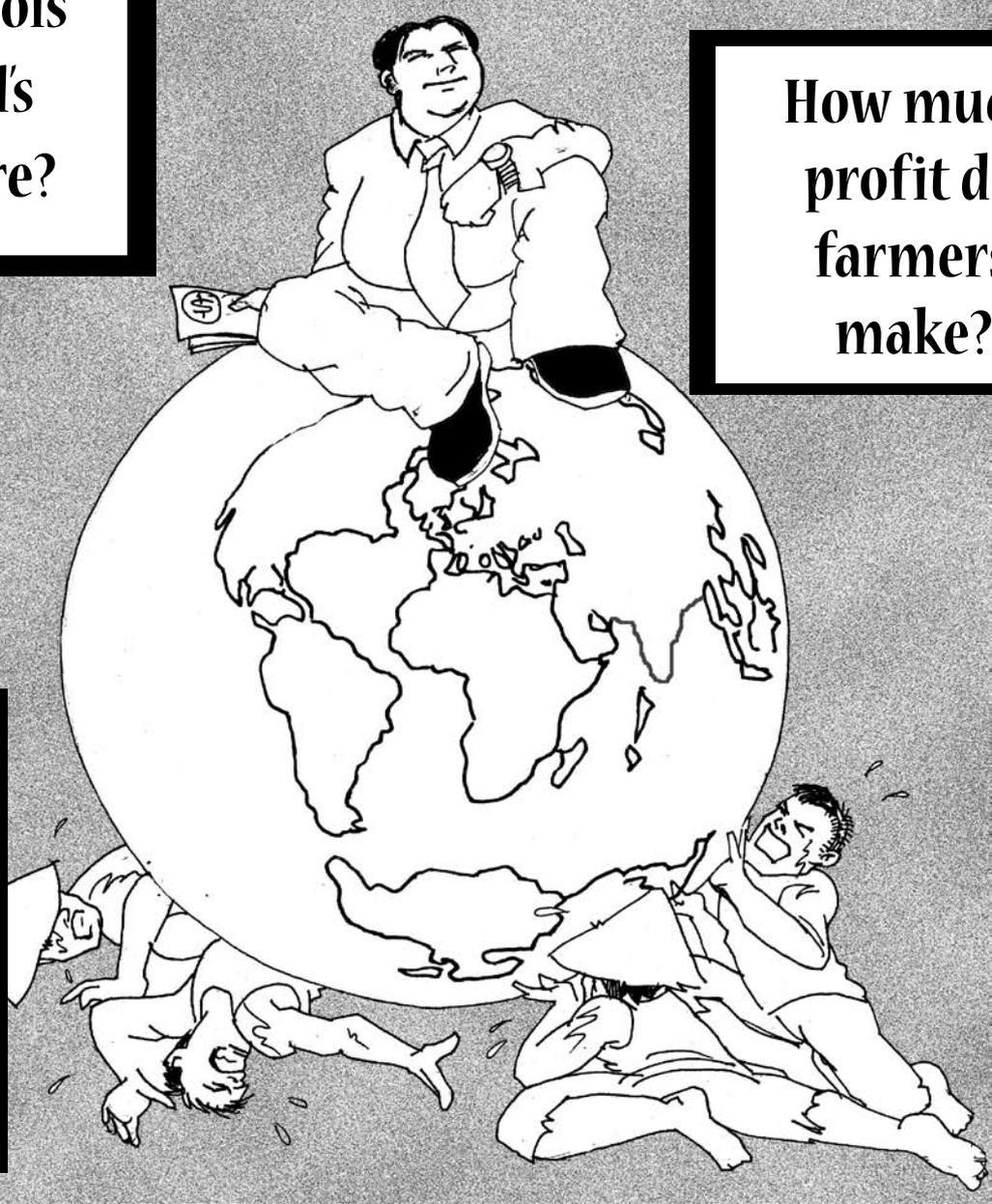
Do you want a genetically modified future?

Other questions worth considering

Who controls
the world's
agriculture?

How much
profit do
farmers
make?

Who is
getting
the
most
profit?



Market forecasts...

Insecticide sales expected to increase 0.6% per year

Fungicide sales expected to increase 1% per year

GMO sales expected to increase 13.8% per year

Source: www.soyatech.com/bluebook/news/viewarticle.ldml?article=20010920-6

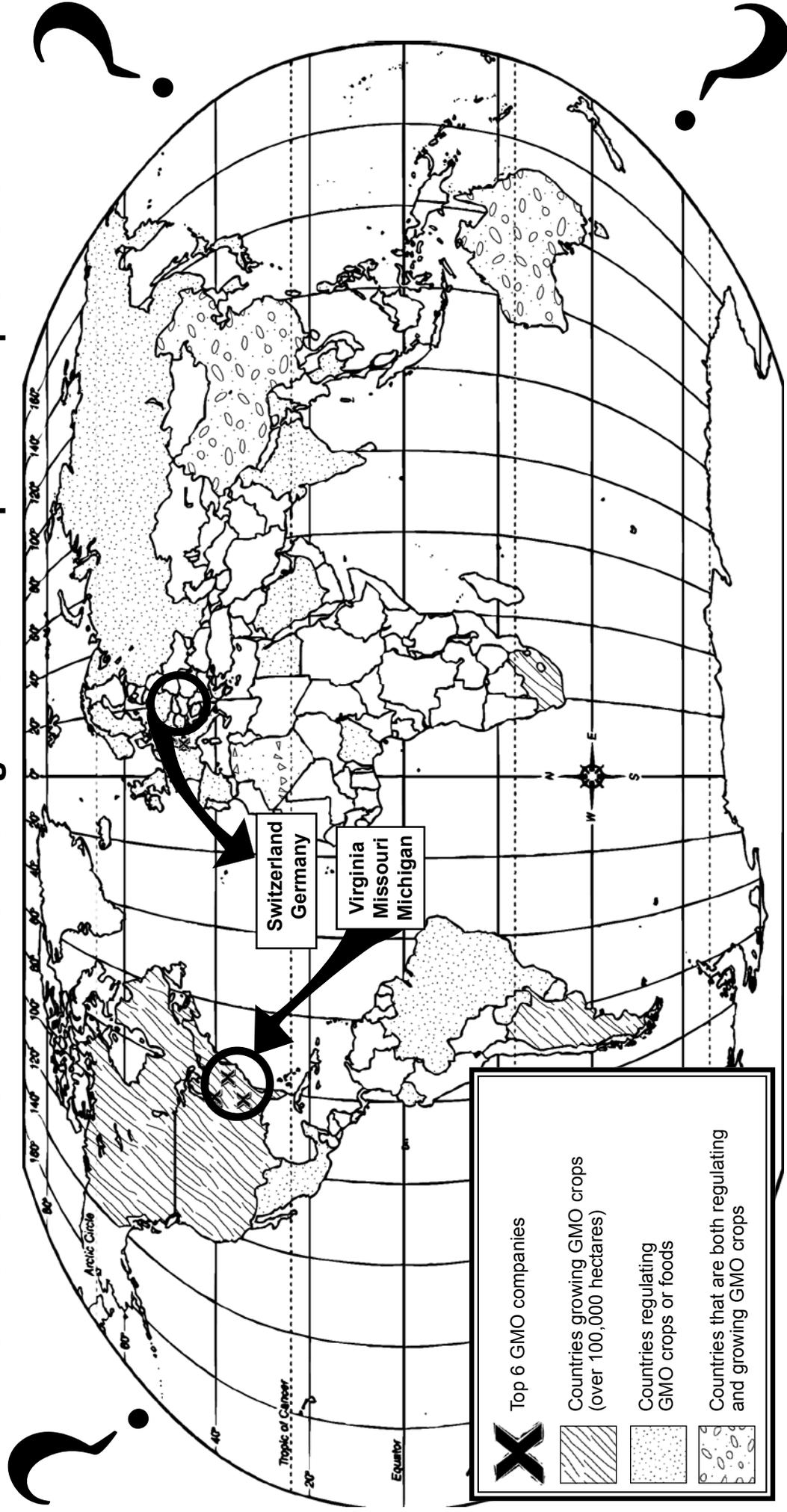


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GMO in our world today

Why are the head offices of some GMO companies located in the same countries that are restricting GMO consumption and production?



Do you want a genetically modified future? Does our globe?

The impacts of global GMO distribution

Where are GMOs produced?

Monsanto – USA (Missouri)
Syngenta – Basel, Switzerland
Bayer – Leverkusen, Germany
BASF – Ludwigshafen, Germany
DuPont – USA (Virginia)
Dow Chemical – USA (Michigan)

These statistics are changing constantly.

As the GMO industry grows, imbalances within our agricultural

industry and the global economy are increasing.

Where are GMOs grown?

Countries producing over 100,000 ha	in 1999 (mha)	in 2000 (mha)
USA	28.7	30.3
Argentina	6.7	10.0
Canada	4.0	3.0
China	0.3	0.5
South Africa	0.1	0.2
Australia	0.1	0.2

Countries regulating GMO

Africa: Aljazair, Egypt, Nigeria

Asia: Sri Lanka, Thailand, China, Japan, Philippines, India, Taiwan, South Korea, China

Europe: Norway, Austria, Germany, the United Kingdom, Spain, Itali, Greece, France, Luxembourg, Portugal, Russia, Poland, Bosnia, Switzerland, Norway, Sweden, the Czech Republic, Latvia

Latin America: Brazil, Paraguay, Ecuador

The Middle East: Saudi Arabia, Israel

North America: Mexico

The Pacific: Australia, New Zealand, Pacific island countries (14)

What will Indonesia do?

Sources: <http://www.greenpeaceusa.org/ge/>, <http://www.twinside.org.sg>, <http://www.isaaa.org/kc/>
<http://www.soyattech.com/bluebook/news/viewarticle.ldmi?article=20010920-6>

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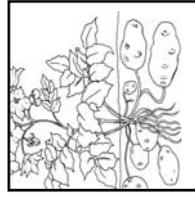
Beware of GMO in Indonesia!

GMO Research in Indonesia

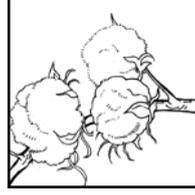
There are already many GMO crops being field tested and researched in Indonesia. Most of the research and trials are being undertaken without the general public knowing. Even people close to the trial site who could be affected are not aware that these trials are taking place.

The reason these crop trials are of concern is that there is the potential for Genetic Contamination from GMO crops to FARMERS' CROPS, with GMO genes modified with bacteria or viruses depending on the type of GMO trial that is taking place.

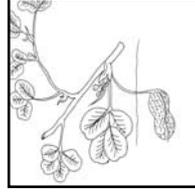
Some GMO crops currently being field tested



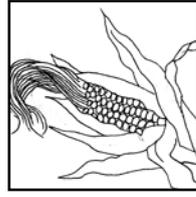
POTATO
Insect resistant.
Balitan, Balai, USA.



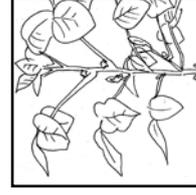
COTTON
Insect or herbicide resistant. Monsanto.



PEANUT
Virus resistant.
Balitbio, ACIAR.



CORN
Insect or herbicide resistant. Monsanto, Pioneer Balitbio, ABSP.



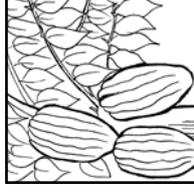
SOYBEAN
Herbicide resistant. Monsanto



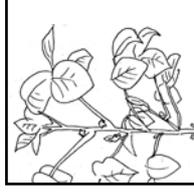
RICE
Insect resistant.
P3B LIPI.

GMO crops

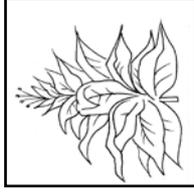
currently being researched



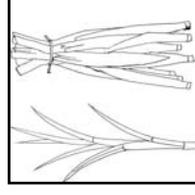
COCOA
Insect resistant.
UPBP.



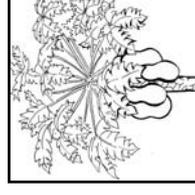
SOYBEAN
Insect resistant.
Balitbio.



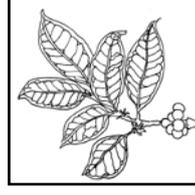
TOBACCO
Virus resistant.
Balitas.



SUGAR CANE
Insect resistant.
P3GI.



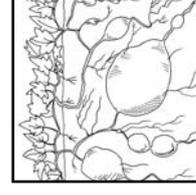
PAPAYA
Virus resistant.
Balitbio, Balitas, and Balitbu.



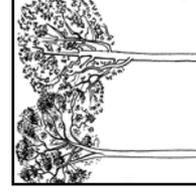
COFFEE
Virus resistant.
UPBP.



CHILLI
Virus resistant.
IPB.



SWEET POTATO
Insect or virus resistant. Balitbio, Monsanto.



TIMBER TREES
Insect resistant.
Indah Kiat.

The big question is: Where are they testing these products?

Shouldn't we know where these testing sites are?

How could contamination affect you?

Loss of local varieties – GMO crops are not sufficiently tested for environmental or human health issues. If after more testing is done there are problems with GMO crops, it will be too late, because the local varieties will have the GMO genes in them and they could have the same problems as the GMO crops.

Loss of markets – export and organic markets are not interested in receiving GMO crops so GMO contamination of your crops will prohibit you from accessing these markets.

Would you allow GMO trials on your land?

There is a whole range of potential environmental & human health risks associated with GMO crops and GMO food. Aside from that is the potential contamination of your neighbour's crops if you use GMO.

To protect yourself and everyone in your area against contamination

- Make sure that you are planting local seeds
- Tell your neighbours about the potential risks of planting GMO crops so they will want to do the same
- Work together with others in your area to find out if GMO crop trials are happening in your area.

Case

On March 15th, 2001, 40 tons of GM cotton seeds arrived in Makasar (South Sulawesi) from South Africa. They were imported by PT Monagro Kimia, the Indonesian subsidiary of US-based agrochemicals giant, Monsanto.

Local NGO activists tried to block the trucks from leaving the airport because the seed should have been quarantined for detailed examination before distribution. They accused the company of attempting to disguise what they were doing by using trucks marked "rice delivery". The NGOs also protested against the use of the Indonesian military to guard the trucks.



Source: www.isaaa.org, Herman (2000), Mulyoprawiro, 2000, Slamet-Loedin, 2000 "Down to Earth" 49, May 2001.

GMO and consumer issues



GMO foods = foods that are made from GMO crops

What kind of foods contain GMO ingredients?

In the US, there are indications that 60-75% of all non-organic supermarket foods “test positive” for GMO ingredients. In general, fresh food or processed food products containing soybeans, corn or canola are products that MAY contain GMO ingredients. Other possible items include papaya, tomatoes, potatoes, squash & sugar beets.

In Indonesia, these products were tested and found to contain GMO ingredients: Isomil Soy Infant Formula, Indofood Soysauce, ABC Soysauce, Bango Soysauce, Pringles Potato Chips, and Simba Corn Flakes.

Possible risks of consuming GMO foods

Toxins and poisons – Genetically engineered products clearly have the potential to be toxic and a threat to human health. In 1989 a GMO brand of a dietary supplement killed 37 Americans and injured more than 5,000 others who already had a pre-existing illness before taking the supplement. Also In 1999, Dr. Arpad Pusztai’s research found that GMO potatoes spliced with DNA from the snowdrop plant and the Cauliflower Mosaic Virus, a commonly used viral promoter in making GMO plants, are poisonous to mammals.

Cancer Risks – In the US Monsanto is selling GMO recombinant Bovine Growth Hormone (rBGH), which is injected into dairy cows so they produce more milk. The milk & dairy products of injected cows could pose the possibility of human breast, prostate, and colon cancer. A number of studies have shown that humans with elevated levels of a by-product of this hormone in their bodies are much more likely to get cancer.

Food Allergies – Eating foreign proteins spliced into GMO food products may harm people with food allergies. Stringent pre-market safety testing is necessary to protect public health. Mandatory labelling is also necessary so that those suffering from food allergies can avoid GMO foods and public health officials can trace allergens back to their source if GMO food allergies occur.



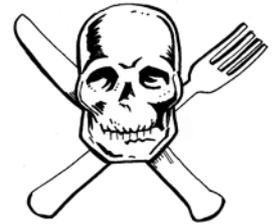
Other concerns worth considering



Food quality: Concentrations of beneficial compounds thought to protect against heart disease and cancer were lower in genetically modified soybeans than in traditional strains. These and other studies, including Dr. Pusztai's, indicate that genetically engineering food is likely to result in foods lower in quality & nutrition.

Antibiotic Resistance: When GMO's are made; they often link it to another gene, called an antibiotic resistance marker gene that helps determine if the genes were successfully spliced into the host organism. Some researchers warn that these genes might unexpectedly recombine with disease-causing bacteria or microbes in the environment or in the guts of animals or people who eat GMO food which, could contribute to the public health danger of antibiotic resistance. If infections cannot be cured with traditional antibiotics, this will lead to development of even stronger cures for infections.

Pesticide Residues: The leaders in biotechnology are the same giant chemical companies that sell toxic pesticides. These companies are genetically engineering plants to be resistant to herbicides that they manufacture so they can sell more herbicides to farmers who, in turn, apply stronger herbicides to crops to kill weeds.



So, what can you do about it? As the anti-GMO campaigns in Europe have shown, mass grassroots action is key to stopping GMO and moving agriculture in a sustainable direction...

1. Keep informed on GMO issues by visiting the websites listed below and working with local NGO's.
2. In cities ask your grocery store manager for a written statement on their policy regarding GMO foods. Request that they identify which food products are GMO and which are not, and then label them as GMO or GMO free.
3. Buy your foods from farmers you know and trust are not using GMO crops.



4. Organize public education forums, and news-making events in your local community about GMO Crops & Food.
5. Communicate with your elected public officials, political candidates and regulatory agencies. Ask them to:
 - Ban GMO products.
 - Enforce labelling of all GMO food products.
 - Enforce strict pre-market safety testing of all GMO products.
 - Enforce GMO corporations and labs to be liable and subscribe to long-term liability insurance.

Source: www.greenpeaceusa.org. www.purefood.org. Ditemukan, *Produk Makanan Mengandung Bahan Transgenik*, Kompas, Feb 2002.



This fact sheet was developed by IDEP Foundation

More information: www.idepfoundation.org

GMO crops and farmers

Potential impacts of GMO crops for farmers:

1. Lower yields.
Studies show that GMO crops can actually get lower yields.

2. Higher input costs.
GMO seeds cost a lot more money and require other inputs as well.

3. Increased agrochemical use.
Studies show agrochemical use can increase when growing GMO crops.

4. Patent contracts.
GMO companies make you sign a contract controlling your options.

5. Loss of local varieties.
As with hybrids, wide scale use of GMO seeds can cause the loss of local varieties & reducing biodiversity.

6. Unsustainable monoculture.
Growing GMO crops promotes unsustainable monoculture.

7. Loss of organic Bt sprays.
In the world organic farmers use non-toxic Bt (*Bacillus thuringiensis*) sprays.

8. Complicated management.
With GMO crops you need to use complicated resistance management strategies.



Some potential effects of GMO crops for farmers



1. Lower yields. There are documented studies that show that yields of GMO crops are not what was promised by the companies and certain crop yields are actually lower than conventional varieties.



2. Higher input costs. The cost of GMO seeds is much higher than hybrid seeds and local seeds. Also, there is often the requirement to purchase additional pesticides & fertilizers in a package deal system.



3. Increased agrochemical use. The major form of GMO crops (herbicide tolerant) are designed so that farmers will spray more herbicides on their crops. There are also cases where insect resistant GMO crops (Bt. Crops) actually have higher insecticide use.



4. Patent contracts
Farmers using GMO seeds around the world are required to sign contracts aimed at protecting the company's patents on the GMO seeds and also forcing the use of other agro-chemicals and other growing decisions usually left up to the farmer.



5. Loss of local varieties. As this was the case with high adoption of Hybrid seed varieties. GMO seeds could lead to the loss of local varieties. Farmers will no longer continue to save local varieties and because GMO crops may contaminate the local varieties that remain.



6. Unsustainable monoculture. The wide spread use of GMO seeds will lead to a monoculture system of agriculture which through out history has proven unsustainable and very risky both financially and because the farmers are dependant on the price at harvest time and ecologically because of pest and disease outbreaks.

7. Loss of organic Bt sprays.
One of the few organic options for spraying insect & pests is the use of Bt. GMO crops. Using Bt. Genes are going to cause resistance to Bt. and leave organic farmers without that option.

8. Complicated management.
To prevent resistance from insect pests, Bt. Crops should use a refuge strategy which means that at least 25% of the farmers land should be grown with conventional varieties and therefore making management much more difficult.

GMO and chemicals

Is it true that we need less chemicals when farming GMO crops?

How can we trust companies that say: "*Bt. (Bacillus thuringiensis) crops that prevent certain types of caterpillars from eating the plants is the second most widely used GMO technology in the world. It decreases insecticide use, reduces insecticide costs and increases yields for farmers that adopt the technology.*"

However there hasn't been any significant decrease in insecticide use. In fact in 1999 over a quarter of the cotton growing areas using Bt. Cotton in the US dramatically increased their insecticide use due to a need to eradicate a nontarget pest. If standard pesticides or more sustainable farming practices were being used this may not have been necessary. (See graph for more details).

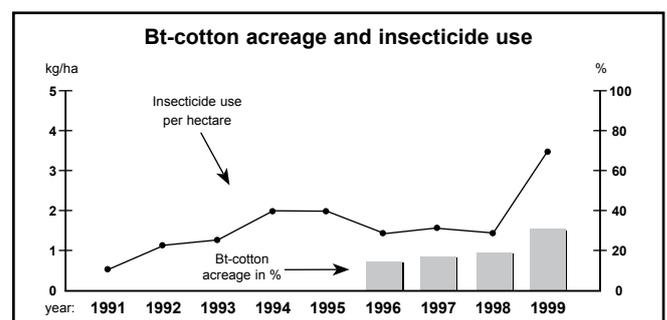
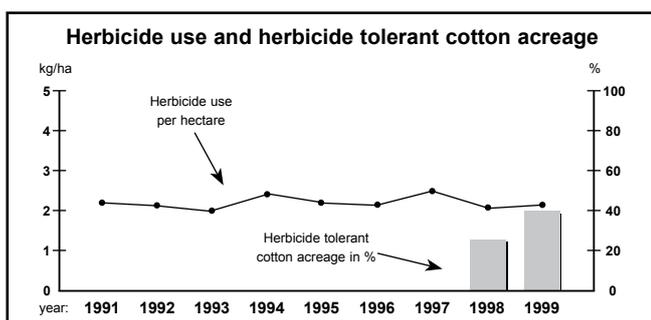


They say the most widely used GMO crops on the world market today are herbicide resistant crops. There are many types of GMO crops commercially grown that have this trait.

The same companies that sell these GMO seeds, own the patent on these seeds. They also sell the specific herbicide that the crops are resistant to, and they own the patent on that as well.

They say the main reason for using herbicide tolerant cotton is to improve weed control and the overall convenience of using the herbicide tolerant system they offer.

However, it seems that there has been no significant decrease in overall herbicide use since the introduction of herbicide tolerant cotton (see graph on right for more details). In fact per acre herbicide use has increased but steadily from 0.81 lbs/acre to 1.06 lbs/acre since the introduction of herbicide resistant cotton.



Some GM products on the world market

These products may be sold outside of the u.s. with different names!

Monsanto

Bollgard® Insect-Protected Cotton

NewLeaf® Insect-Protected Potato

Roundup Ready® Herbicide resistant Soybeans, Cotton & Corn

YieldGard™ Insect-Protected Corn

Bollgard with BXN Cotton (Produced by Calgene, LLC, unit of Monsanto)

MONSANTO



Novartis

NK Knockout™ Corn

NK YieldGard™ Hybrid Corn

Attribute™ B.t. Sweet corn

Novartis Seeds Roundup Ready® Soybeans



Aventis

LibertyLink® Herbicide resistant Corn

LibertyLink® Herbicide resistant Canola

StarLink (Bt.) Corn



American Cyanamid

CLEARFIELD™

herbicide resistant Corn

SMART® Canola Seed

BASF

Mycogen



NatureGard® Hybrid Seed Corn

IMI-Herbicide tolerant Corn

DeKalb Genetics Corp

DeKalBt™ Insect-Protected Hybrid Corn

DeKalb Brand Roundup Ready® Corn

DeKalb GR Hybrid Corn



Garst Seed Company

High pH Tolerant Corn Hybrids

Gray Leaf Spot Resistant Corn Hybrids

G-Stac™ Corn Hybrids

Garst

DNAP Holding Corporation

FreshWorld Farms® Tomato, cherry tomato & sweet mini-peppers

FreshWorld Farms Endless Summer® Tomato



Most of these products are not yet being sold in indonesia which ones are?

Source: BIO Member Survey (www.bio.com) No reduction of pesticide use with Genetically Engineered Cotton.

WWF International 2000, Do GM crops mean less pesticide use? Charles Benbrooke, The Royal Society of Chemistry, 2001.



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More information: www.idepfoundation.org

Let's compare agricultural systems

Agricultural systems

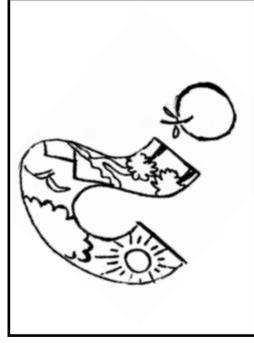
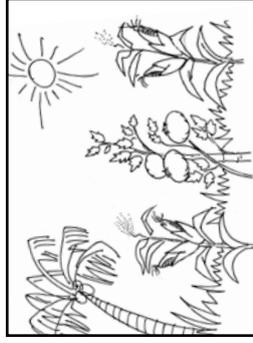
Traditional agricultural practices that would have been used in villages 50 years ago, based on many years of development with very little outside influence. All agricultural inputs would have been from the local area.

Green revolution, conventional, high external input agriculture that arrived in Indonesia in the late 1960's and 1970's. This agriculture system uses hybrid seeds, chemical fertilizers, & chemical pesticides, which need to be purchased.

Sustainable agricultural system that is based on a "back to nature" approach to farming. It involves less reliance on seed and chemical companies for agriculture production, traditional systems and other innovative ideas.

Biotechnvlogical agricultural system that uses genetically engineered or modified seeds that have been developed and imported by large multinational corporations as part of their agricultural system.

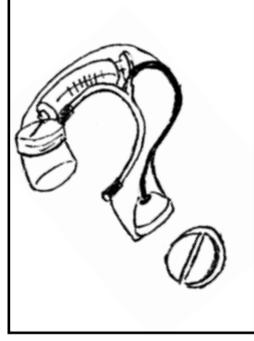
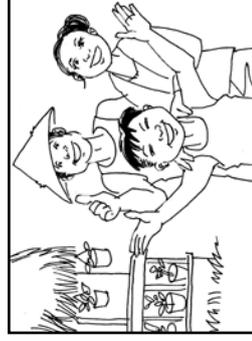
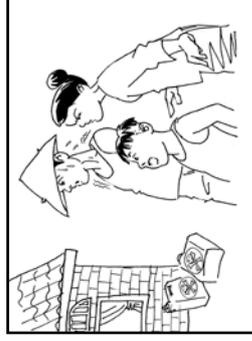
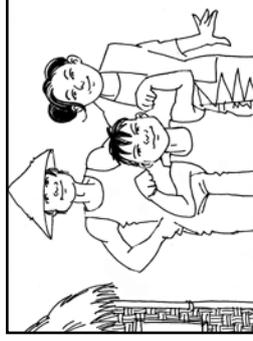
From an environmental perspective



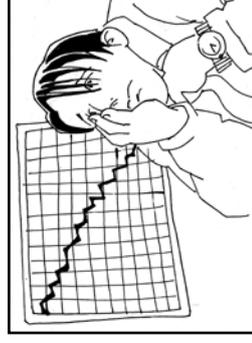
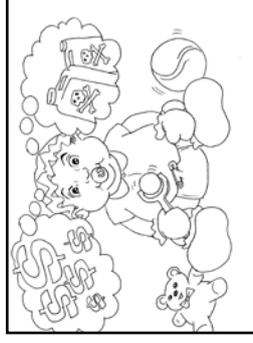
From a farmer's perspective



From a health perspective



From the corporations' perspective



Which agricultural system will you choose for your farm and future?

GMO companies producing seed tell us that they will feed the world

10 reasons they won't:

1. Feed, Not Food.

The two main GMO crops grown commercially in the world – soybeans and corn – are mostly used to feed livestock, not people.

2. Engineering for Convenience.

Research in GMO food has been for the commercial interests of food processors rather than nutritional needs.

3. Substituting Tropical Cash Crops.

GMO is creating substitutes for tropical cash crops which will lead to poorer and hungrier farmers in the developing world.

4. Increasing Farm Debt.

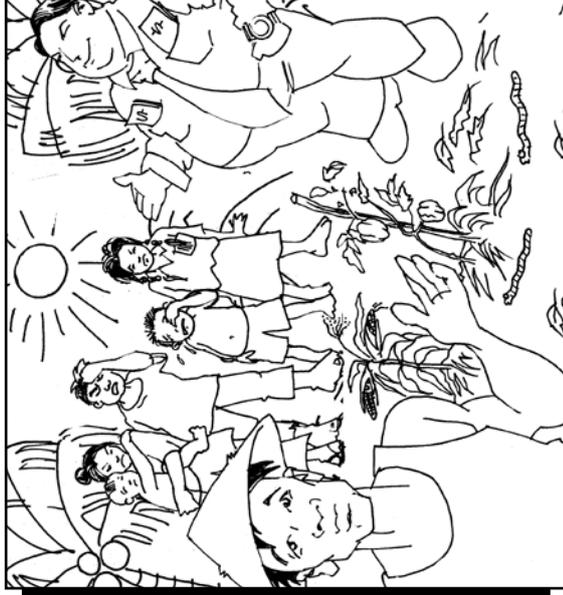
GMO seeds cost a lot more and also require other external inputs, which will lead to poorer and hungrier farmers.

5. Promoting Unfair Farming.

GMO promoters say that farm bankruptcies are a regrettable but necessary price of greater efficiency in agriculture. This leaves farmers without a livelihood.

6. Increasing Destitution.

Displacing “inefficient” small farmers is likely to increase famine and malnutrition not reduce hunger.



Source: *Ten Reasons Why GE Foods Will Not Feed the World*, prepared by The CornerHouse, UK.

7. Unsustainable Agriculture.

GMO seeds in agriculture are likely to have adverse environmental impacts, which will undermine the ecological basis of food production. Growing monoculture is also very high risk economically as monoculture is more susceptible to pest attack and market fluctuations than multiple-plant cropping is.

8. Lower Yields.

GMO crops do not have significantly increased yields. In some cases, yields are lower than those for conventional varieties of the same crop.

9. Increased Corporate Control.

GMO companies gain near-monopoly control over the growing and marketing of some agricultural commodities.

10. Misreading the Problem.

Underlying the claim that GE foods are needed to feed the world lies a fundamentally flawed analysis of the causes of world hunger.

Ask yourself about GMO...

is it the best choice for your farm and future?

Info about doing this exercise: To do this activity, show your group the FS.GMO#009.eng. Let's Compare Agricultural System. In a group of any size work your way down the list comparing the systems of Agriculture. The group discussion is more important than the actual answers. This exercise can go quickly or slowly depending on the time available & how much time you want to allow for discussion.

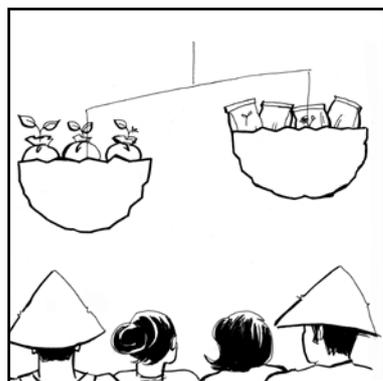
	Aspects of agricultural systems <i>Including both monetary (things farmers pay or receive money for) and non-monetary items.</i>	Traditional Practices	Green Revolution	Sustainable Agriculture	Biotechnology Systems	Choose 1 symbol for each box
						 positive for farmers  negative for farmers  no change for farmers
Questions						
1	Seed					Cost? Available in your village? Can you grow it? More/less labour?
2	Fertilizer					Cost? Available in your village? Can you make it? More/less labour? Affects on your soil?
3	Pesticides					Cost? Available in your village? Can you make it? More/less labour? Do people using it get sick?
4	Planting					Who does it? Cost? More/less labour? Best results from planting system?
5	Weeding					Who does it? Cost? More/less labour? Best results from weeding system?
6	Harvesting					Who does it? Cost? More/less labour? Best results from harvesting system?
7	Yield					Do you get more or less yield? Is product better or worse quality?
8	Marketing					Is the crop sold more easily? Do more or less people want to buy or use your crop?
9	Selling price					Is the price you sell your crop for higher?
10	Food at home					More or less food at home? Is it produced on your farm? How easy is it to store?
11	Export					What is the export potential? Are other countries interested in buying the crop?
12	Cultural					Has this system had an impact on the local Culture? Ceremonies, gifts, local food etc?
13	Plant biodiversity					Are there more or less species of crops? Are more or less varieties of each type of crop grown?
14	Social					How systems change social practices (labour, how people work together etc) in your village.
15	Water quality					Do the streams have more or less insects, fish, frogs etc? Is the water more clear/clean?
16	Soil quality					Does the soil have more or less living things in it? Is the land harder or difficult to dig?
17	Beneficial insects					Are there more or less beneficial species (spiders, lady-bugs) in the system?
18	Other insects + mammals					Do you have more/less rat problems? Are there more/less animals in and around your fields?
19	Risk					What happens if price of the crop decreases? What happens if pests destroy your crop?
20	Legal issues					Are there more/less legal documents in this system? Land contacts, seed contracts etc.

Do you want a genetically modified future?

Some ideas for using this exercise

Facilitator preparation

For this exercise it is important to have a knowledgeable facilitator. The facilitator will have to already understand the 4 basic forms of agricultural systems or else take some time to learn about the basic issues surrounding them. The GMO awareness series will help with background fact sheets and articles on Biotech agriculture.



Group discussion

Start by comparing Traditional agriculture with Green Revolution agriculture. Ask the questions listed, plus any other related questions on the topic. Any specific topic may include some things that are better or worse. Allow a few minutes of group discussion for each and then put the issue to a vote.

Vote and fill in the table

Let the group decide which symbol to put for Green Revolution system issues. Put an up arrow in the box if the participants feel that activity is better for the farmers. Put a down arrow if they feel it is worse. Put a dash if there is no change or difference between the systems and its effects on farmers.



Group discussion and summary

Spend a few minutes after each comparison to summarise the pros and cons of each of the agriculture systems discussed. Then compare the Green Revolutions system to a Sustainable Agriculture system and follow the same instructions as above. Put the votes in to the appropriate boxes. Continue this until you finish comparing Biotechnology Agriculture to Sustainable Agriculture.

Follow up to this exercise

After that you can engage in a discussion on which system is preferable and what methods can be used to achieve it. This would be a good time for the groups to make some action plans for further training and discuss how to facilitate that training. For example, where to find the resource people for Sustainable Agriculture training.



GMO and the environment

Your natural environment could look like this...



- 1. Genetic Pollution.**
Genes from GMO plants can breed with non-GMO plants, contaminating local varieties.
- 2. Negative Effects to Soil.**
GMO plants could negatively impact the soil ecology of the land they grow in.
- 3. Super Weeds.**
Weeds could develop herbicide resistant traits causing the need for more toxic chemicals.
- 4. Super Pests.**
Pests will most likely develop resistance to the insecticidal proteins of GMO crops.
- 5. Plant viruses.**
Viruses often mutate and GMO crops resistant to viruses could speed up this process.
- 6. Insect & Animals Impacts.**
Non-target insect and animal species may also be affected by GMO Bt (Bacillus thuringiensis) Crops.
- 7. Loss of Biodiversity.**
How are GMO crops going to interact with existing species on the planet?
- 8. Forest Ecology Impacts.**
Faster growing GMO species have the to potential to out compete native plant for sunlight, nutrients and water.

Do you want a genetically modified future?

Possible effects that GMO crops can have on the environment

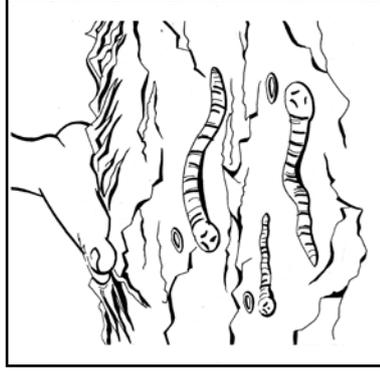


1. Genetic pollution.

Wind, rain, birds, bees and insect pollinators have begun carrying genetically-altered pollen into adjoining fields, polluting the DNA of crops of organic and non-GE farmers.

2. Negative effects on soil.

Research has shown that GMO Bt. crops can effect beneficial soil microorganisms. GMO crops could transfer genes to local soil micro-organisms and this may affect both soil ecology and fertility.



3. Super weeds.

Herbicide resistant GMO crops have the potential to cross-pollinate genes with related weed species in the area. These weeds could then become herbicide resistant, which would then require stronger, more toxic chemicals to control them.



4. Super pests.

Because of their short life cycles, insect pests are known to gain resistances to specific pesticides in a very short period of time. Will this be the case with GMO crops that produce insecticidal proteins such as Bt. Crops?



5. Plant viruses. Studies are indicating that GMO plants that resist viruses can cause the viruses to mutate into new, more virulent forms.

This has the potential to cause even further damage if the virus strains continue to mutate, making plant diseases more difficult to control and treat.

6. Insect and animal impacts.

Studies are starting to show that GMO Bt. crops are adversely affecting a number of beneficial insects including ladybugs, lacewings, bees and possibly birds. There is also a controversial report that GMO crops have effects on certain butterfly populations.

7. Loss of biodiversity

It's unclear how GMO plants will interact with existing species on the planet. Without proper testing, local and global biodiversity could be in danger. Genetic contamination of related species is a definite possibility. There could be many as yet unknown interactions between species that may cause a major concern.

8. Forest ecology impacts.

GMO trees are designed to grow very quickly. Because of this they have the potential to compete with local tree varieties for nutrients, water and sunlight, completely changing the ecology of the forests in which they grow.



Agriculture & IPR (Intellectual Property Rights)

Owning exclusive rights to plants and animals?

Intellectual property rights

Transnational companies have the right to patent seeds that they have been able to modify genetically. Farmers will be tied into contracts to buy both seeds and chemicals, and will not be allowed to plant farm-saved seed. If a farmer uses genetically engineered seeds, that farmer has to sign a gene licensing agreement, which includes royalty fees and specifies the seed, fertilizer and chemicals that must be used.



80% of the patents on GM foods are owned by just 13 corporations. Such rights have traditionally been associated with non-living inventions in industrialized and market-based economies. Now they are being used in agriculture. Patents are generally granted by a government authority conferring the exclusive right to make, use or sell an invention (including GMOs) for a period of 20 years.

A real life case

Percy Schmeiser was accused by Monsanto

because he, they say, planted GMO Canola seeds without a license and did not pay the royalty fee to the company for using its technology. He claims he did not buy Monsanto's patented seed, nor did he obtain the seed illegally, and that pollen from genetically engineered canola seeds blew onto his land from neighboring farms. Monsanto's inspectors came to his farm and took seed samples without his permission. It would appear that Percy Schmeiser was a victim of genetic pollution from GMO crops.

The court ruled that he must pay Monsanto CN\$ 19,832 for licensing fees and CN\$153,000 for Monsanto Court costs. Not to mention the case costs to the Schmeisers, which was CN\$200,000. To pay this, they had to mortgage their land and use most of their retirement savings.

1. Farmers and native people will no longer be able to use seeds or natural resources available in their environment, or to implement agricultural methods that they have long used. Instead, they will have to pay royalties to big companies or a group of people who own agricultural product patents.

2. Monopoly practices could occur. Only small numbers of giant companies will own the patents that will give them "special rights" to seeds in the world. That mean, they will have a monopoly and determine prices, as they choose.

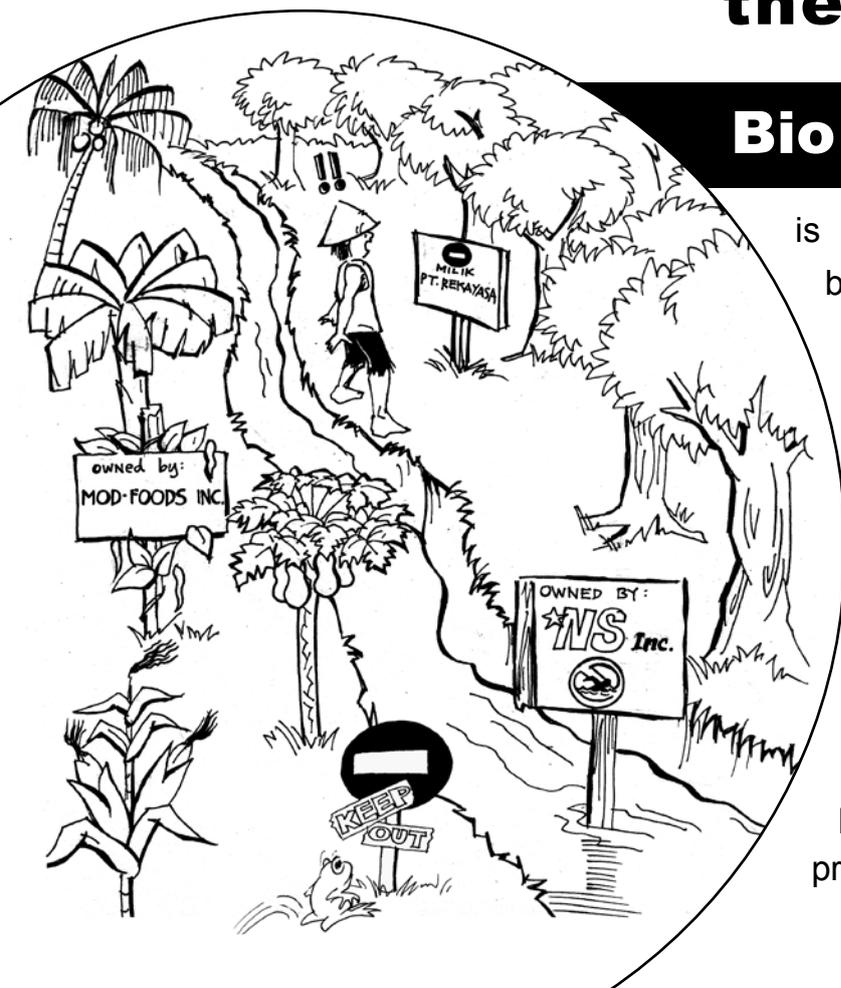
3. This will of course increase farmers' dependency on giant multinational companies.

If they patent our rice...

they patent our life!

Bio prospecting

is the exploration, extraction & screening of biological diversity and indigenous knowledge for commercially valuable genetic and biochemical resources. A growing number of pharmaceutical corporations and biotechnology companies (& their intermediaries) are researching the forests, fields and waters of the developing world in search of biological riches and indigenous knowledge. Northern based institutions seek access to tropical biodiversity for the primary purpose of developing patented & profitable products.



Bio piracy

is theft or robbery of biological and genetic resources indigenous to a country. These biological resources are often the main targets of enterprising businessmen because of their many uses in agriculture, health care and chemical industries. The process of bio piracy involves collection of samples of biological resources; this material then undergoes product development for use on a commercial scale. Also, with bio piracy, there is no need to pay any financial compensation to the country where the biological material originated. This material is often patented.

Source: www.percyschmeiser.com, www.natural-law.ca/genetic/NewsMay-June98/GENews5-15Rice.html

A real life case

A seed company from Texas, RiceTec patented three hybrid versions of Basmati - they are Texmati, Jasmati, and Kasmati. Ricetec produced the varieties by crossbreeding Basmati seed with American long grain rice. RiceTec was also given permission to claim that its brands (the Texmati, Jasmati, & Kasmati) are "superior to Basmati".

This company is now able to produce their own rice in America, sell it in America and even export it. That means India may lose its lucrative Basmati export market in America and other countries in the world. The Indian government is concerned, because Basmati rice export makes a large contribution to India's income, & has been the source of living for many poor Indian farmers.

This fact sheet was developed by IDEP Foundation

More information: www.idepfoundation.org

