

# Biopiracy

student edition



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*Stuffed and Starved* by Raj Patel  
*Biopiracy* by Vandana Shiva  
*Diversity Depletion* by P.C. Sinha  
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# Introduction

What does colonisation look like in today's world? **Colonisation** is not a thing of the past; it continues today through the use of patents and **Intellectual Property Rights (IPRs)**. In the same way that European colonisers claimed ownership of the land and natural resources in the colonies 500 years ago, transnational corporations (TNCs) are now claiming ownership of indigenous knowledge and biodiversity through IPRs.

Since the beginning of colonisation, the western concept of private property rights has slowly erased indigenous concepts of common property and shared resources. As a result, this western worldview has come to dominate the development of contemporary international trade laws.

Most non-western cultures have always regarded the wild as sacred, and thus use natural resources respectfully. In contrast, colonisers perceived anything that was not fully managed or controlled by them as a threat to their domination. Therefore, anything that practiced self-organisation, including both people and nature, was considered wild, out of control, uncivilised, and in need of modernisation and management.

Europeans morally justified their invasion and expropriation of territory and possessions from other peoples by assuming they had a 'natural' superiority over other humans and nature. This belittlement of non-European societies and nature was essential to the success of colonialism and **capitalism**. Denying the rights of nature, as well



as societies that revere nature, was necessary in order to facilitate uncontrolled exploitation and profits by colonisers.

Colonisers also defended their invasions by claiming that the lands they seized were uninhabited and empty, and that the people who did live there were primitive and incapable of improving their land and natural resources.

Today, companies recognise the value of the indigenous knowledge that colonisers once trivialized, and are now trying to profit from it. Commercial interests use IPRs to legitimise the exploitation of indigenous knowledge and resources, with no compensation to those who have developed and propagated the knowledge over millennia. This exploitation is called **biopiracy**. While indigenous peoples have always recognised the inherent value of plants and other resources, many companies see these resources as having value only with the application of western knowledge.

This western knowledge system prescribes a monetary value for all resources through the practice of capitalist economics. Driven by the constant need to increase profits, capitalism has found ways to profit from land, forests, rivers, oceans, and air. Now that many of these natural resources have been polluted, capitalism must find new colonies to exploit, and is turning to the living bodies of plants, animals and humans to find its next profits.

Just as colonisers justified stealing and piracy as their birthrights, necessary for the spiritual salvation of those they colonised, the **General Agreement on Tariffs and Trade (GATT)** and its patent laws meant to justify biopiracy as the right of western companies, necessary for the economic development of communities in the Global South.

Resistance to biopiracy is a resistance to the ultimate colonisation of life itself.

## DEFINITIONS

**Intellectual Property Rights (IPRs):** Under intellectual property laws, owners are granted certain exclusive rights to a variety of intangible assets, like artistic works; discoveries and inventions; and words, phrases, symbols and designs.

**Colonisation:** Colonisation is the process of a dominant ideology imposing economic, political and social values on other societies through the exploitation of human and natural resources.

**Capitalism:** Capitalism is an economic and political system in which a country's industry and trade are controlled by private owners rather than the state.

**General Agreement on Tariffs and Trade (GATT):** The GATTs were talks between the governments of different countries to make it easier to buy and sell goods between them. The GATT talks began in 1947 and ended in 1995. GATT was followed by the World Trade Organisation (WTO), and was a platform for promoting unrestrained economic control and monopolization of bio-diverse commons.

## HOW CAN WESTERN KNOWLEDGE AND SCIENCE BE USED RESPONSIBLY?

Polio is a crippling virus that affects millions of people worldwide. In the 1950s, a particularly bad epidemic of the disease broke out in the United States. By 1955, a vaccine was introduced that had been developed by virologist Jonas Salk. Salk worked tirelessly to develop the vaccine, even testing it on himself and his family before doing widespread trials.

When Dr. Salk announced the vaccine and was asked in a TV interview who owned the patent for the vaccine, Salk replied, "Well, the people, I would say. There is no patent. Could you patent the sun?" Dr. Salk had no interest in personal profit from his work, he only wanted to stop the epidemic. Later, Salk stated that, "Our greatest responsibility is to be good ancestors." As a result of his vaccine, the polio incidence rate in the United States dropped 90% by 1960. His work is one example of how science can be used responsibly to benefit humanity, instead of to achieve personal profit.

# Chapter 1: Knowledge, Creativity and Intellectual Property Rights

What is creativity? If someone is rewarded for his or her creativity, will it inspire more creativity or increase competitiveness and secrecy? These questions are being raised by the current debate on whether or not patents should be allowed on life forms.

Science can be seen as 'an expression of human creativity that encompasses different ways of knowing'. Recognising diverse traditions of creativity is essential to keeping diverse knowledge systems alive. In the current period of ecological destruction, we do not know who might have key knowledge that will help restore a healthy natural environment and benefit current and future generations of humanity.

Most indigenous knowledge systems are holistic and see humanity as one part of an intricate ecosystem. However, these ecological worldviews have been silenced by the dominant western model of scientific knowledge. This model of science tends to regard ecosystems as consisting of fragmented, individual entities that act and respond on their own, instead of complex networks that react in an interconnected way to slight changes within the system. Life sciences tend to be especially fragmented, but should include the interplay among three different levels of creativity:

- \* Creativity inherent to living organisms that allows them to evolve, recreate, and regenerate
- \* Creativity of indigenous communities that have developed knowledge systems

to conserve and utilize the rich biological diversity of the planet

- \* Creativity of modern scientists in university or corporate labs who find ways to use living organisms to generate profits

Preserving these different creativities will ensure the conservation of both biodiversity and intellectual diversity.

## CREATIVITY THREATENED

The **Agreement on Trade-Related Intellectual Property Rights (TRIPs)** is an international trade agreement that was negotiated in 1994. It is administered by the **World Trade Organisation (WTO)** and sets minimum standards that members of the WTO must follow regarding intellectual property, ranging from patents and trademarks to monopolies for the developers of new plant varieties.

The enforcement of TRIPs shifts common rights that should be shared by all into private rights owned by a few. The agreement excludes ideas and innovations that take place in the 'intellectual commons' – for example, in villages among farmers and in universities among scientists. The resulting IPRs are only recognised when knowledge and innovation generate profits and are capable of industrial application, not when they meet social needs.

Due to TRIPs, 'properties' such as ideas, inventions, and information can be patented by anyone, regardless of whether or not they originated the property being patented. For example, the medicinal use of a specific plant

could have been known and practiced for many centuries, but if someone from an outside community finds out about that specific use, he or she can patent that characteristic. Thus the original users are denied free access to the plant and any uses that become patented.

Instead of stimulating creativity, IPRs stimulate competition and secrecy. Many communities, such as the scientific community, once shared ideas and developed innovations in a communal setting; now scientists feel they must work alone to protect their ideas.

## NEW USES FOR NEEM?

The Neem tree is indigenous to the Indian subcontinent and now flourishes in Africa, Asia, Central and South America. It is most widely known in India, where it has been used for medicinal purposes and applied in agriculture as an insect and pest repellent for centuries.

In 1990, the W.R. Grace Company and the US Department of Agriculture (USDA) tried to patent the Indian neem tree because they also discovered that neem was an effective pesticide. The trouble was that Indians already knew this. So common was this knowledge, known within the farming community for over two millennia, that one Indian MP sneered that '[patenting] neem is like patenting cow dung.'

A Legal Opposition to the patent was filed nine months later. The opponents asserted the fungicidal effects of neem seeds claimed by the patentee had been known and used for centuries on a broad scale in India, both in Ayurvedic medicine and in traditional Indian agriculture. They argued the patent in dispute lacked two basic statutory requirements for the grant of a European patent, namely 'novelty' and an 'inventive step'.

At an Oral Proceeding in May of 2000, it was ruled that the patentee's claim of novelty had been destroyed on the basis of clearly demonstrated prior public use. The 'invention' also lacked an inventive step, and the patent was revoked entirely.

From the *Research Foundation for Science, Technology and Ecology and Stuffed and Starved* by Raj Patel

## DEFINITIONS

**Agreement on Trade-Related Intellectual Property Rights (TRIPs):** TRIPs is an international agreement to give companies more power to own and sell ideas and information. The TRIPs Agreement makes patent laws stronger and gives transnational corporations the power to own genetic information, seeds and new technology.

**World Trade Organisation (WTO):** The WTO is a powerful organisation in which governments make agreements about trade between countries and transnational corporations. The WTO was set up after GATT to increase free trade between countries. The WTO rules make trade for rich countries easier, while making trade for poor countries more difficult.

# Cooperation or Competition?

## Objective:

Students will evaluate the effectiveness of working alone vs working collectively, and understand how creativity is generated in a group setting.

## Materials:

Pens and paper

## Procedure:

1. Inform the students that they are all cotton farmers. This year their fields have been invaded by a pest, and they need to develop a plan for combating the pest invasion before their crop is completely destroyed.
2. Tell students they will have 5 minutes to develop a plan of action. They must work alone, and their plan will be evaluated using the following criteria:
  - \* Effectiveness and efficiency (Is the plan realistic? Does it use resources wisely?)
  - \* Environmental impact (Will chemicals be used? Will organic methods be used? What will be the impact of their plan on other species besides the targeted pest? What about the impact on water and soil resources?)

- \* Monetary Cost (Will any inputs be purchased to carry out their plan?)
- \* Timeline (How long will the plan take to implement? Will there be multiple steps?)
- \* Creativity (How is their solution unique to the area where they live and the resources they have available to them?)

3. Remind students that they must work alone, and if anyone finishes before the 5-minute limit, they will be rewarded for their efficiency (the facilitator can decide on an appropriate reward for the student who finishes first).
4. If anyone finishes before the 5 minutes has elapsed, present him or her with a reward in front of the whole class. Be sure to praise them for their good work.
5. Before students present their plans, inform them that they can now work with a group of 4-5 people to create a comprehensive presentation of the steps they will take to deal with the pest problem. Remind students of the evaluation criteria, and let them know that they have 20 minutes to work. They will then be asked to give a 2-3 minute group presentation to the rest of the class.

6. After 20 minutes, have each group give their presentation. Classmates will evaluate them based on the 5 criteria given.
7. After each group has presented, debrief the activity. Some questions to ask include:
  - \* How did you feel working alone versus working in a group?
  - \* Did you feel that you had all the skills necessary to fulfill all the evaluation criteria when you were working alone?
  - \* What were some of the challenges you faced in developing your plan?
  - \* How did you generate ideas for the plan?
  - \* Were more ideas generated working alone or in a group?
  - \* Was more creativity generated alone or in a group?
  - \* Were there any ideas that your group mates thought of that you didn't think of on your own?
  - \* How did the time pressure and the reward incentive make you feel when you were working individually?

## BROKEN PROMISES OF BT

In March 2002, Bt-cotton was first approved for commercial cultivation in India. The hybrid plant is genetically engineered to contain the bacterium *Bacillus thuringiensis* (Bt), which acts as a pesticide against the bollworm, a common pest that has caused great losses for cotton farmers. Since Bt cotton is genetically engineered to contain the Bt toxin, farmers don't need to spray their fields with pesticides as often to kill the bollworms. In addition, Bt cotton was promised to produce higher yields for farmers. So with lower pesticide costs and higher yields for the farmers, what could go wrong?

Here's what's going wrong: because the bollworms are constantly exposed to the toxin in Bt cotton, they evolve quickly to resist it. So in addition to buying the Bt cotton seeds each year (which are about 4 times as expensive as the hybrid seeds previously used), farmers still have to buy pesticides to kill the pests that have developed resistance to the crop. In addition, the Bt cotton seeds cross-pollinate with surrounding species, which has caused species like spider mites, leaf hoppers and beet worms to evolve resistance and attack cotton crops in addition to the bollworm. As a result, the ecological balance surrounding Bt cotton fields has been completely thrown off and farmers' debt is increasing instead of decreasing, as seed companies promised.

The debt inflicted by planting Bt cotton has become so severe that many farmers have given up planting cotton. In extreme cases, the overwhelming debt has led farmers to commit suicide.

Working with nature, instead of against it, is the only way to restore ecological balance and grow crops that are good for both humans and the earth. By using bio-diverse agricultural methods, we can ensure that our fields produce enough for us and for future generations.



# Chapter 2: Can Life Be Made? Can Life be Owned?: Redefining Biodiversity

What makes a cow a cow? In 1991, the biotechnology company Gen Pharm biologically engineered 'Herman,' a dairy bull whose offspring produced milk with a human protein. The milk was to be used for making infant formula. Gen Pharm patented Herman and claimed that they owned him and all of his descendants for the duration of their 20-year patent. The company claimed that they created Herman, and he was therefore not a naturally-occurring cow. Yet when the safety of the infant formula containing the bioengineered ingredient from Herman's offspring was challenged, Gen Pharm said, "We're making these proteins exactly the way they're made in nature."

When property rights on plants and animals are granted, the patented organisms are seen as new products – something that could not occur in nature. But when it is time for patent holders to take responsibility for any possible negative consequences of releasing their **genetically modified organisms (GMOs)** into the world, they defend their creations being natural, and therefore safe.

Scientists in universities or company laboratories shuffle genes around, but they do not *create* the organism that they then patent – they must base their design on an existing life form. No person has ever created a living organism from nothing. Thus, future generations of patented plants and animals cannot be considered the inventions of the patent holder. Any offspring produced by the patented organism are

products of the organism itself, yet it is still the patent holder who profits from them.

When organisms are viewed as individual parts, each of which can be separated, modified and owned, then the wonders and complexity of living beings are forgotten. This practice of reducing an organism or system to its individual parts is known as **reductionism**. By treating living organisms like machines and genes like remote controls that dictate what the organism does, reductionist scientists fail to recognise how all parts of a cell or an organism interact and influence each other.

If species and ecosystems are engineered and controlled externally, they become vulnerable to disease and environmental impacts because they lose their freedom to self-organise, adjust, and evolve. They do not heal or adapt; they break down. When a system is controlled externally, two forms of violence are encouraged: by treating organisms as mere machines, they are denied their capacity to self-organise; and by allowing the patenting of future generations, they are denied their ability to self-reproduce.

So if Herman the dairy bull is seen merely as a body of genes, whose children are not his own, can we still call him a cow?

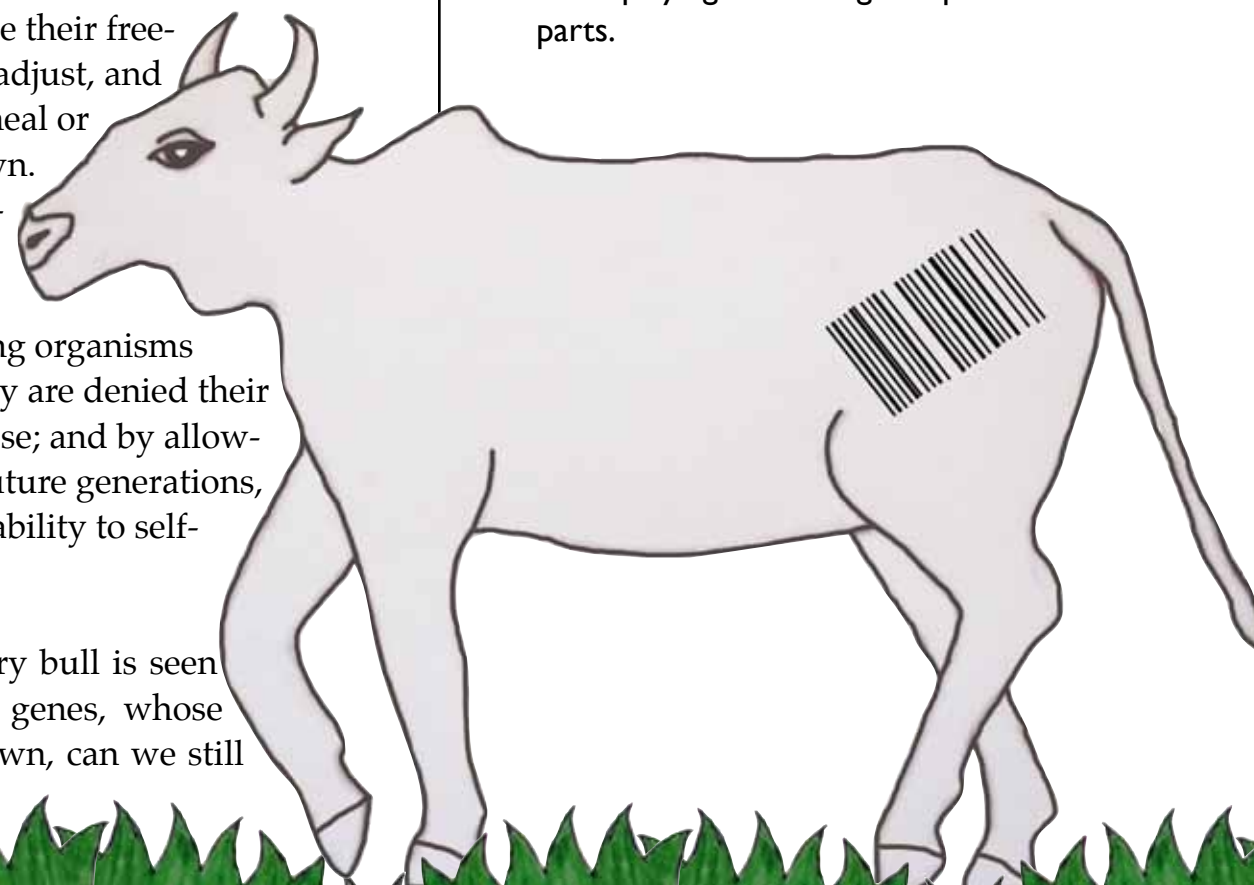
## DEFINITIONS

**Biotechnology:** Biotechnology uses biological knowledge to move or change the genes or DNA inside a plant or animal. It can be used to make a plant more resilient to certain weather conditions, like droughts or floods, or to make high-yielding crop varieties. Biotechnology is also called genetic engineering.

### Genetically Modified Organisms

**(GMOs):** A genetically modified organism is a plant, animal, or bacterium that has been changed by scientists so that its genes are different; or genes from another plant, animal or bacterium have been added to it.

**Reductionism:** Reductionism is the practice of simplifying something complex to its individual parts.



## THE SEED KEEPERS

by Fawaz Turki of Palestine

Burn our land  
burn our dreams  
pour acid onto our songs  
cover with sawdust  
the blood of our massacred people  
muffle with your technology  
the screams of all that is free,  
wild and indigenous.  
Destroy  
Destroy  
our grass and soil  
raze to the ground  
every farm and every village  
our ancestors had built  
every tree, every home  
every book, every law  
and all the equity and harmony.  
Flatten with your bombs  
every valley; erase with your edits  
our past,  
our literature; our metaphor  
Denude the forests  
and the earth  
till no insect,  
no bird  
no word  
can find a place to hide.  
Do that and more.  
I do not fear your tyranny  
I do not despair ever  
for I guard one seed  
a little live seed  
that I shall safeguard  
and plant again.

# Nature's Intrinsic Value

## Objective:

To demonstrate the intrinsic value of nature and understand the difficulties of placing monetary or instrumental value on nature.

## Materials:

Pens and paper

## Procedure:

1. Take your class outside and sit under a tree or in an area of natural beauty.
2. Ask the students to work with a partner and discuss the following questions:
  - \* How would you describe this tree?
  - \* What do you receive from this tree?
  - \* What does the tree give to other living things?
  - \* What does the tree receive from other parts of nature?
  - \* What are all the possible uses of this tree?
  - \* Is the tree more valuable when it is rooted in the ground or when we cut it for other uses?
3. Ask students to share their answers for each question. It is important to emphasise that there is not a right answer.
4. Next, have each pair go through their list of uses for the tree and ask them to place a monetary value on each use.

5. After 5-10 minutes, have students share their answers. There should be a large range in values. As they share their answers, ask if they thought about the value of groundwater retention? Did they think about the value of preventing top-soil erosion? What about the value of converting carbon dioxide to oxygen?
6. Once everyone has shared, ask the class which student should get to decide the final price for each use. How do we decide the value of the tree and all its uses? Should they even have a price, or should they be available to everyone for free?



## NINE SEEDS

Navdanya started in 1987 as a programme of the Research Foundation for Science, Technology and Ecology (RFSTE), founded by physicist and environmentalist Dr. Vandana Shiva.

Navdanya's mission is to protect nature and people's rights to knowledge, biodiversity, water, and food. The organisation's main objective is to promote peace and harmony, justice and sustainability.

Navdanya, meaning 'nine seeds', promotes sustainable agriculture and seed saving, raises awareness about the hazards of genetic engineering, and defends people's knowledge from biopiracy. Navdanya has established 54 seed banks across India in order to conserve indigenous seed and protect India's biodiversity, and trains farmers in food security, seed sovereignty, and sustainable agriculture.

Navdanya works with its members to provide a fair price for farmers, sustainable economic opportunities for rural communities, and healthy and nutritious food for consumers. The movement works with both farmers and consumers so that everyone knows the true cost of food production. Farmers receive a fair wage for their work while conserving water, soil, and land, and providing GMO-, and chemical-free products for consumers.

Navdanya is also a women's empowerment organisation. The gender programme called Diverse Women for Diversity seeks to strengthen women's grassroots movements and to provide a platform for women from all over the world to share their knowledge.



# Chapter 3: The Seed and The Earth

What makes a seed a seed? All sustainable societies are centered around the process of regeneration, ensuring that life forms are capable of reproducing themselves generation after generation. Modern industrial society, however, moves quickly and rarely thinks about future generations. This shortsightedness tends to separate humans from nature, because it inspires actions that do not consider our long-term impacts on other humans and the environment.

This non-ecological interpretation of nature and society allows the Earth itself to be viewed from a reductionist point of view. From this perspective, the Earth is an inert sum of individual parts, which can be recreated and rearranged by people to suit their needs.

If humans consider themselves creators who can modify and create life, then the power of fertility and regeneration is removed specifically from females, who are the source of life on earth. Biotechnologies take the wonders of creation and regeneration and place them in the hands of scientists in laboratories, thus



removing the natural regenerative power of women.

While colonisers once sought wealth in conquering foreign lands, their gaze is now turning to other sources of riches. The interior spaces of plants, animals and humans are seen as among the last colonies. When land colonisation began, the earth was degraded into mere matter that acted as a source of capital; this went hand in hand with the denigration of non-European cultures. Now, the diminution of seeds from a regenerative source of life to raw materials with no **intrinsic value** goes hand in hand with the devaluation of those who regenerate life through the seed – that is, the farmers and peasants of the **Global South**.

When seeds are created in laboratories using biotechnology, they are stripped of their fertility, which means if they are saved and planted the next year they won't germinate. Using biotechnology seeds thus forces farmers to purchase seeds from breeders each year instead of saving the best seeds from their own crops and planting them the next season,

as has been done for thousands of years. The inability to save seeds robs farmers of the only capital they have, while instead placing that wealth in the hands of corporations.

Corporations call their biotechnology seeds 'advanced,' 'elite' or 'high-yielding,' yet they have lost the ability to regenerate – which is the basic function of a seed. Regeneration is more than mere repetition, done externally in a laboratory. By definition, seeds must be able to reproduce themselves. Therefore, can we really call something that cannot regenerate itself a seed?

## DEFINITIONS

**Global South:** The term Global South was originally simply a general description of what was formerly referred to as the Third World, which is primarily in the Southern Hemisphere. Countries comprising the Global South are less economically powerful than those comprising the Global North.

**Intrinsic Value:** Intrinsic value is the permanent and inherent worth of an idea or resource, separate to its monetary price.

**Monsanto:** Monsanto is a US-based multinational biotechnology corporation. It is the leading producer of genetically engineered seed and provides the technology in 90% of the world's genetically engineered seeds.

## RIG VEDA HYMN TO HEALING PLANTS

Mothers, you have a hundred forms and a thousand growths.  
You who have a hundred ways of working, make this person whole for me.  
Be joyful, you plants that bear flowers and those that bear fruit.

## THE TRUE COST OF GMOs

The fields of Percy Schmeiser, a Canadian farmer, were contaminated with Monsanto's GMO canola in 1997. Since he had been a seed dealer and breeder, he could prove he had not purchased or planted GMO seed. However, Monsanto relentlessly investigated and sued him and he was financially ruined by years of litigation. Ultimately the Canadian courts sided with Monsanto, saying that it didn't matter how Monsanto's genes got into Schmeiser's fields; once they were there, the patents could be enforced.

Schmeiser has pledged to do what it takes to stop Monsanto from doing what it did to him to other farmers. Farmers in both the United States and Canada are continuing their crusade to stop Monsanto's contamination suits and to ask the courts to protect their right to save seeds. There are class action and antitrust lawsuits against Monsanto for price fixing and seed monopolizing, but so far the courts have ruled in favor of Monsanto. Given the way patent law works, the only hope for a remedy may be legislation.

~From *Uncertain Peril* by  
Claire Hope Cummings

# Seed Search

## Objective:

Encourage students to become seed keepers and to document the seeds that are most relevant to their family's eating habits.

## Materials:

Apple, or other common fruit. Envelopes or jars to store seeds in.

## Procedure:

1. Ask students to walk around their homes and collect seeds. Encourage them to walk outside and to look in their kitchen. In order to convey the ease of this activity to them, take an apple and cut in half. Display the seeds inside and explain that seeds are all around us – sometimes people don't even notice them.
2. Ask students to write a list of what they found and to bring a seed sample to class.
3. In class have students display what they found and what they determined to be seeds. Did they find a variety of seeds? Did they fail to find anything that resembled a seed? If so, inquire as to why.

4. Upon the results from the class, discuss the variety of seeds within their general environments. An important point to stress is that seeds are not elusive entities, but are found within everyone's reach.

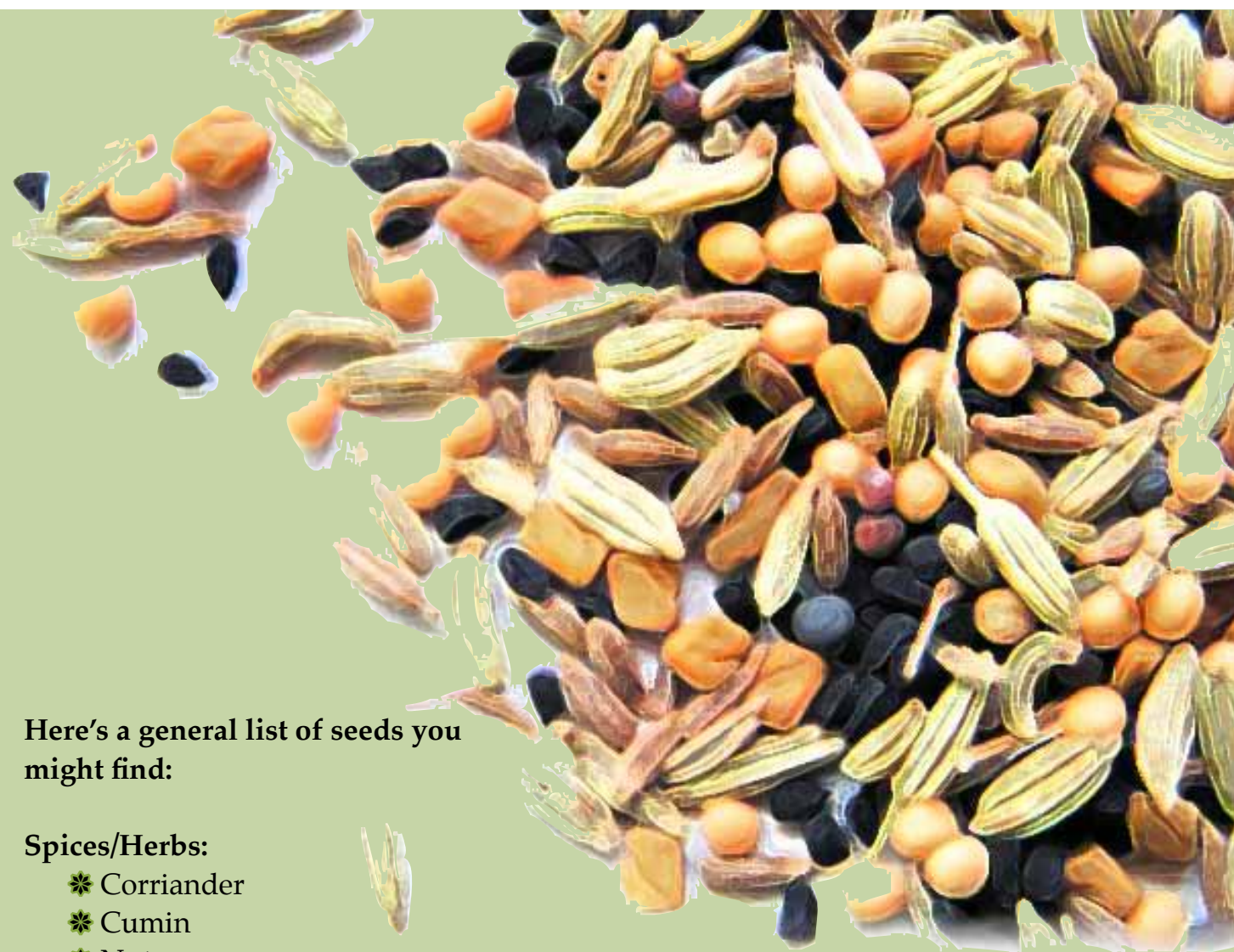


5. Have students research the history/genealogy of one of the seeds they found. For example, ask them to discover where the seed is indigenous to? What were its past uses (medicinal/culinary/construction)? What are its contemporary uses (medicinal/culinary/construction)? How has its use within human history changed or evolved?
6. Is this a seed that has been genetically modified? If so, have students research the impact of GM technology on the use of the plant and its potential impact on human society and the earth's environment.
7. If desired, encourage students to write a topical poem about the seed they brought in. You can use the following template:

NOUN (Seed's Name)  
2 ADJECTIVES  
3 VERBS  
A 4-WORD PHRASE  
NOUN (a synonym of the first noun)

## Example:

Garlic  
Sticky, pungent  
Inflects, infuses, pervades  
breath, flesh, and spirit  
Aoli



## Here's a general list of seeds you might find:

### Spices/Herbs:

- \* Corriander
- \* Cumin
- \* Nutmeg
- \* Cardamom
- \* Mustard
- \* Ginger Root
- \* Turmeric Root
- \* Fennel
- \* Sesame

### Fruits:

- \* Apple
- \* Guava
- \* Citrus
- \* Tomato
- \* Papaya

### Flowers:

- \* Marigolds
- \* Nasturtiums
- \* Hybiscus
- \* Poppy

### Vegetables:

- \* Capsicum
- \* Brinjal
- \* Chili
- \* Pumpkin
- \* Bitter Gourd
- \* Squash

# Chapter 4: Biodiversity and People's Knowledge

**W**hy is biodiversity disappearing so quickly? There are currently two main causes of large-scale biodiversity destruction:

1. Internationally financed mega-projects. These include the building of dams, highways, mines, and aquaculture in areas of rich biodiversity.
2. The technological and economic push towards homogeneity in forestry, agriculture, fishery, and animal husbandry. The **Green Revolution** in agriculture is an example of the deliberate replacement of biological diversity with biological uniformity and **monocultures**.

There are two major ways of viewing biodiversity. Common property systems recognise the intrinsic worth of biodiversity, whereas private property systems see value in the natural world only when created through commercial exploitation. While common property systems help protect biodiversity through a combination of utilisation and conservation, private property systems use IPRs and only act to protect capital investment in natural resources.

Private property systems are based on the **privatisation** of knowledge and biodiversity. This leads to the devaluation of local communal knowledge and the disregard of local rights. Claiming to have discovered or invented a use for natural resources that is already wellknown by local communities can be seen as intellectual and material piracy. As a result of privatisation, people who have

passed local knowledge on for generations lose access to this knowledge and the resources vital to their survival and creativity, as well as being prevented from conserving their cultural and biological diversity.

**Bioprospecting** is the exploration of commercially viable genetic and biochemical resources. The idea behind the term is borrowed from prospecting for gold or oil. This metaphor suggests that prior to extraction, the resource lies buried, unknown, unused, and without value. Yet the communities who harbor traditional knowledge and pro-

tect biodiversity are usually quite aware of the uses and value of the resources they shelter. The practice of bioprospecting therefore ignores the prior use, knowledge, and rights associated with biodiversity.

When indigenous communities are asked to sell their knowledge to corporations, they are essentially being asked to sell the right to practice their traditions in the future, and to provide for themselves through their own knowledge and resources. This has already happened in the case of seeds and plant-based medicines derived from knowledge

taken from the Global South. Of the 120 active compounds currently used in modern medicine, 75 percent have uses that were already known in traditional systems.

Local communities have used, developed, and conserved biological diversity for thousands of years, and have been the custodians of biological wealth on this planet. Their authority, knowledge, and rights must be respected if the foundations of biodiversity conservation are to be strengthened and deepened.

## DEFINITIONS

**Green Revolution:** The Green Revolution was the process of industrialisation of agriculture through the spread of high-yield hybrid crop varieties fed by chemical fertilisers and protected by pesticides and herbicides.

**Bioprospecting:** Bioprospecting is the search for plants or animals from which commercially valuable products can be obtained.

**Monoculture:** Monoculture is the cultivation of one kind of plant in a particular area. When we cultivate only one type of plant, it takes up all of some nutrients, but leaves others in the soil. This makes the earth unbalanced. Monocultures are also more vulnerable to pests and diseases.

**Privatisation:** Privatisation is the process of transferring a business, industry or service from public to private ownership.



# The Web of Life

## Objective:

The goal of this exercise is to demonstrate how the life cycles of all living beings on our earth are interdependent. All creatures, including microbes, fungi, plants and animals, are interconnected and thus their survival is reliant upon the health and balance of all others.

## Materials:

1 spool of yarn

1 set of cards with the names of different parts of the food chain (the number of cards will be determined by the number of students present).

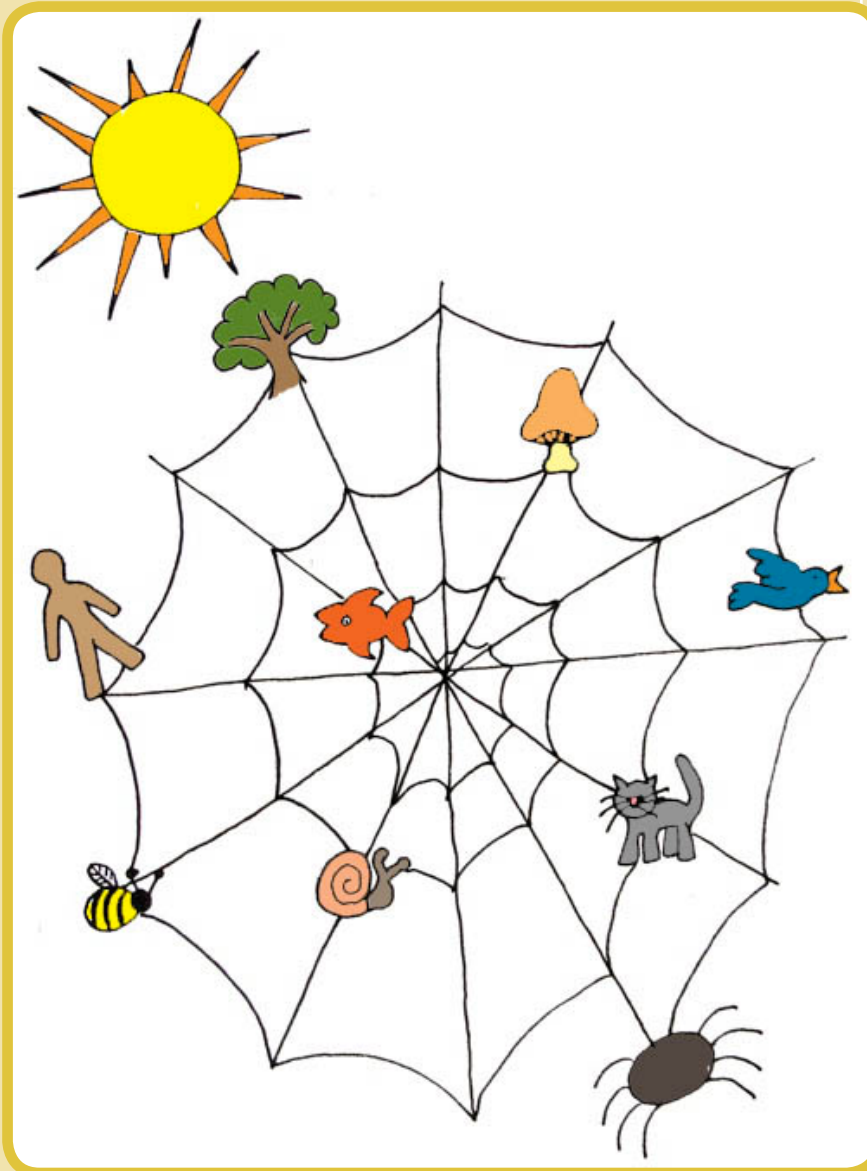
Examples include: sun, mango tree, mosquito, butterfly, worm, bacteria, tiger, rabbit, spider, songbird, hawk, water, snail, fish, alligator, frog, antelope, human, etc. Ensure that your food chain includes plants, animals (herbivores, omnivores and carnivores), insects, decomposers, humans and components of the natural landscape such as soil, water and air.

## Procedure:

1. Have all students stand in a circle. Select one student to stand in the middle of the circle. That person will represent the sun and will hold the ball of yarn first.
2. Pass out the Web of Life cards. Ensure that each student has received, read

and understood their role in the Web of Life.

3. Starting from the 'sun', ask students who obtains their energy directly from the sun. For example, a student with the 'flower' card would answer that the flower obtains its energy directly from the sun. The 'sun' will then toss the ball of yarn, still holding onto the original end, to the student with the 'flower' card. That stu-



dent will then tie the yard around the tip of his or her index finger.

4. The facilitator will then ask who gets their energy/food from the flower. Perhaps the bumble bee will answer and the flower will pass the yarn to the bumble bee who will wrap the string around his or her finger.
5. This continues until everyone has been passed the ball of yarn. It is okay if one student has received the ball of yarn more than once.
6. At this point lead a discussion about ecology and ecosystems. Emphasise the interdependence inherent in the definition of these terms.
7. Now, the facilitator will move around the web and will place pressure on the strings at certain intersecting points. Ask students to raise their hand if they can feel that pressure placed on the web. Ask them to see where the pressure is coming from. Perhaps the pressure came from the bumble bees. Provide information about the possible extinction of this species and ask the bumble bee to release the string from his or her index finger. Notice that the web will begin to go slack.
8. Ask students, who in the Web of Life will be impacted by the loss of the bumble bee? Perhaps the apple tree, who needs the bee for pollination, will suffer and

fail to produce fruit. Ask the apple tree to release the string from his or her index finger. Notice that the web droops further. Ask the students who in the Web of Life will be impacted by this loss...and so on.

9. Continue with this question until everyone except the sun is left standing. Ask students to pick up the string one more time and tell the sun (who is still holding the string) to walk away. This time, everyone feels loss.

## Wrap-Up Questions/Discussion:

Brainstorm ways in which students can reduce their impact on our earth's ecosystem. Through this conversation, concepts that work to rejuvenate the earth such as composting, establishing productive school/community/kitchen gardens, saving seeds or walking as opposed to driving can be addressed.



# Chapter 5: Tripping Over Life

**W**hy is diversity important? Diversity is the key to **sustainability**. However, **genetic engineering (GE)** reduces the world's biological diversity through the expansion of monocultures and monopolies. This reduction of biological diversity threatens to disrupt the ecological sustainability of our entire earth.

The most significant ecological impacts of TRIPs are related to changes in the way that species interact within earth's ecosystem as a result of GMOs. Human actions that do not foster sustainability and diversity disrupt the interactions within an ecosystem, and can threaten the survival of various species, from microbes in the soil to large mammals including humans.

Five ecological and sociocultural impacts of TRIPs are:

## 1. The Spread of Monocultures:

Diverse crop varieties have evolved according to different environmental conditions and selection by skilled agricultural practitioners. The genetic variability of these crops is an insurance against pests, disease and environmental stress. Genetically modified seeds are genetically homogenous and designed for monoculture farming techniques, which inherently destroy biodiversity. Consequently, the widespread use of monocultures displaces the use of thousands of local seed varieties. As a result, crops are susceptible to disease, pests and environmental variability because they are not well adapted to local growing conditions.

## 2. Intensification of Chemical Pollution:

**Multinational Corporations (MNCs)** develop crops with specific genes that make the plant resistant to **herbicides**. These herbicides are often made by the same company that engineered the seed. For example, the biotechnology company Monsanto has developed a seed called Round-Up Ready Canola that is resistant to the application of the company's herbicide Round-Up. The financial interests behind these developments lead to the expansion of agricultural chemical availability and use. As a result, stronger monopolies and profitability for companies that produce both seeds and the herbicides to accompany them are created, and **agrochemical** pollutants increase.

## 3. New Forms of Biological Pollution:

**Biological pollution**, or gene transfer, refers to the **hybridisation** of GE crops with wild varieties. The resulting hybrid plants develop the same resistance as the GE crop, thus rendering the herbicides meant to kill them ineffective. These **super weeds** have the capacity to invade neighboring fields and overpower other species, sometimes resulting in the extinction of the intended crop.

## 4. Undermining the Ethics of Conservation:

When the intrinsic value of a species is replaced by its instrumental value, such as GE crops that are regulated and controlled under IPRs/TRIPs, the ethical basis for biodiversity conservation is undermined. The idea of owning life is not new; people own their pets and farmers

own their livestock. Yet the creation of GEOs and the enforcement of TRIPs creates a new concept of ownership that is not only extended over the GE seed itself, but over the reproduction of the entire organism, including future generations covered by the life of the patent.

## 5. Alienation of Local Rights:

Conserving biodiversity depends on the rights of local communities to enjoy the fruits of their efforts, rather than MNCs to profit from their knowledge and labour. IPRs in seeds, plant material, and indigenous knowledge systems alienate the rights of local communities and undermine the stake they have in the protection of biodiversity. When people feel alienated from their land, then incentives for local biodiversity conservation are diminished.



## DEFINITIONS

**Sustainability:** Sustainability is the capacity to endure. In ecology, the word describes how biological systems remain diverse and productive over time.

**Genetic Engineering:** Genetic engineering is the direct human manipulation of an organism's genetic material in a way that does not occur under natural conditions.

**Multinational Corporations (MNCs):** Multinational Corporations are corporations or enterprises that deliver services in more than one country.

**Herbicides:** Herbicides are substances that are toxic to plants, and are used to destroy unwanted vegetation like weeds.

**Agrochemical:** Agrochemicals are used in farming to make crops grow more quickly and to kill insects and weeds.

**Biological Pollution:** The movement of living organisms, either accidentally or intentionally, from the places where they evolved to new environments where a lack of natural enemies permits their population to explode.

**Hybrid:** A hybrid plant or animal has parents from two different species, and has been bred to have particular characteristics.

**Super Weeds:** Super weeds are made when the genes from a plant genetically engineered to stop poisons from harming it are mixed with the genes of a local plant. Super weeds are difficult to kill because they are resistant to some pesticides and herbicides.

# The Seed Keeper's Market

## Objective:

To demonstrate the importance of seed diversity and to highlight the right of humans to their seed heritage.

## Materials:

50 Organic food cards representing 8-10 different crops, including marigolds

3 Genetically Modified tomato cards

3 plain black cards (these represent pesticides, herbicides and fertilizers)

## Note:

Above quantities are optimal for 15 students. If more students are present an additional 5 food cards per student are required.

## Procedure:

1. Standing in a circle, distribute Organic Seed Cards evenly among students. Try to provide each student or group with cards that are of a similar vegetable. The goal is for each student to start with a monocultural 'deck' of Organic Seed Cards.
2. Inform the students that they are members of a farming community and that they are attending their community's annual seed exchange. The seed exchange is a tradition that has been practiced in their village for many years, and is an event at which farmers share both seeds and knowledge. Each farmer brings the best seeds from his/her farm and shares them with other farmers. This ensures that each farmer has a diverse array

of quality seeds for the upcoming growing season. A diverse variety of seeds results in both a robust ecosystem and a healthier diet.

3. Ask students to exchange their seeds. Give 3-4 minutes for this part of the activity. At the end of the time, students should have the same number of cards that they started with, but with greater variety.
4. Once complete, ask the students to show their cards and decide whether they think they have a diverse set of seeds for this year's growing season.
5. Explain that this year there's a pest that affects the crops. Please hold up a black card that symbolizes the pests. Tell students to look at their deck of cards. If they have a marigold card in their hand, their farm is safe and will not suffer crop failure. This is because, as organic farmers, they use natural methods of pest control such as companion planting. Those without a marigold card will suffer crop failure and thus lose 2 of their cards. Students may choose which cards to give up.



6. A year has now passed. Repeat steps 3 & 4.
7. Next, ask students if they would like to try planting high-yielding super tomatoes this season. The tomato seeds should be introduced as a sales pitch from a corporate seed company. Advertise the tomatoes as large, juicy, and high yielding. Emphasise that they will grow fast, and are pesticide and herbicide resistant.
8. Give the 3 GM tomato cards to one student. Tell that student that he or she has to pay for these seeds and thus must sell off the remainder of his or her crops to the seed company. As the student gives you all of his or her other cards, remind the student that the GM tomato seeds are special!
9. Tell students that another year has passed and that they have again returned to the annual Seed Keeper's Market. Repeat steps 3 & 4.
10. At the end of the seed exchange, find out where the GM tomatoes are. Have they been traded? If so, tell student who originally had the 3 GM tomato seeds that they cannot trade the GM seeds, as the corporation holds a patent on them. To trade these seeds is to infringe upon IPRs and therefore is illegal. The corporation has sold the one student the right to use the seeds, but the seeds and any future generations belong to the corporation. As a result of breaking IPR law, the students are fined. They must give the corporation all their remaining seeds to pay for the GM seeds. They are no longer productive farmers and they are out of the game.



11. Turn your attention to the original GM tomato farmer. Bring to him or her the 'black' cards that represent the commercial pesticides, herbicides and fertilizers that are required of GM tomatoes. Remind the student that these products are not free. The student will also have to pay for this year's GM tomato seeds. At this point the student will be without the means to pay for the seeds and is thus out of the game.
12. Ask the remaining students to show their cards, and inquire if they think there is diversity within their farms. Conclude this exercise by asking the following questions:

- \* Was planting the GM seeds worth the investment?
- \* Ask the GM farmer how he/she feels. Do they believe the game was fair and the corporation was honest when it first presented the GM seeds to the game?
- \* Do they feel that the introduction of GM seeds was a benefit to their community's seed exchange?
- \* Bring this process back to their personal lives. What are the environmental and human health implications of consuming GM foods versus organic foods?

# Chapter 6: Making Peace With Diversity

How can we resist the violence inflicted by a globalised world economy? Globalisation is not the cross-cultural interaction of diverse societies; it is the imposition of a particular worldview held by one class, one race and often one gender on all others. In this sense, 'global' does not represent human interest; it represents a particular local and parochial interest and culture that has been globalised through its reach and control, its irresponsibility and lack of reciprocity.

Forces such as colonisation, the green revolution and contemporary corporate globalisation are responsible for homogenous development and the creation of monocultures. As a result, they have introduced **structural violence** at three levels.

The first level is political violence; without centralised control and coercive force, this diverse world cannot be formed into homogeneous structures. The second level is ecological violence; homogenisation pushes species towards extinction, and monocultures are vulnerable to ecological breakdown. Any disturbance to one part of an ecosystem affects all other parts. The third level is social violence; centralised global integration means the conditions of everyday life become increasingly controlled by outside forces.

The green revolution (GR) was a movement led by Western institutions in the 1960s to introduce high-yielding crop varieties (HYVs) throughout the Global South. Increased production from HYVs was dependent on

external inputs like chemical fertilisers and pesticides. The GR illustrates the three types of structural violence in the following ways:

✿ **Political violence:** Rural development in general, and the GR in particular, were prescribed as means for peace by politically stabilising rural areas and preventing the influence of the **Red Revolution** outside China. Control over people and nature was an essential element of the centralised and centralising strategy of the GR.

✿ **Ecological violence:** The GR was based on the assumption that technology is a superior substitute for nature and hence a means of producing growth unconstrained by nature's limits. In practice, this created new scarcity through ecological destruction, reducing the availability of fertile land and the genetic diversity of crops. As a result, thousands of crops and crop varieties have been wiped out and substituted with monocultures of rice, wheat and maize across the Global South.



✿ **Social violence:** Since the external inputs like fertiliser and pesticides required by the GR were scarce and expensive, conflict and competition between classes and regions ensued. With the government as referee, every policy decision translated into the politics of "we" and "they" – "we" have been unjustly treated, while "they" have gained privileges unfairly. Local elites attempted to cling to power by manipulating the deepened ethnic or religious identities that emerged as a backlash.

There is only one way to end such epidemics of violence. It is the destruction of local economies and social organization that pushes people into insecurity, fear and civil strife. Thus we must, with sensitivity and responsibility, once again make peace with diversity.

## DEFINITIONS

**Structural Violence:** Structural violence describes situations where unfair access to political, economic, and other kinds of resources and power is sustained or exacerbated because of repressive structures.

**Red Revolution:** The Red Revolution is the name given to the spread of communism during the Cold War. The threat of a revolution was used to justify the economic, political, and social control of rural development strategies and the Green Revolution.

## THE POWER OF CITIZEN ACTION

Can GE seeds really reduce farmers' dependence upon pesticides, or are they just another form of biopollution?

According to M/s Mahyco, the creator of Bt Brinjal, their transgenic Brinjal seed is capable of doubling crop yields and reducing pesticide use by 42%. Their claim is based upon the ability of the Bt Brinjal to produce the Bt toxin which assists to prevent pest infestations, particularly that of the Fruit and Shoot Borer.

In response to this development, the Genetic Engineering Appraisal Committee (GEAC) of India announced in September 2007 that field tests of the Bt Brinjal would commence. They forecast that the commercial sale of Bt Brinjal would begin in India in 2009.

This announcement ignited the interest and concern of activist groups throughout India. Concerned by the impact of GE crops on the health of the environment, humans, and India's food supply, citizen action has resulted in a temporary moratorium placed upon the production and testing of Bt Brinjal in India. Thus, on February 10, 2010, the Indian Environment Minister affirmed that the commercial release of Bt Brinjal had been halted. However, this decision still leaves the future of Bt Brinjal in India open to debate.

# Power Dynamics

## Objective:

To understand structural violence, power dynamics, and resource distribution.

## Materials:

Paper of different colors  
Pencils  
Markers  
3 Large envelopes  
Glue  
Scissors

## Procedure:

1. Before students arrive, divide materials into the 3 envelopes. In the first envelope, put a plentiful assortment of materials, which could include a variety of colored paper, markers, scissors, glue, and other useful tools for making a presentation. In the second envelope, put 2 pieces of plain white paper and 3 pencils. In the third envelope, put 1 piece of plain white paper and 1 pencil.
2. When students arrive, inform the students that they will be making a group presentation about power dynamics.
3. Divide the class into 3 groups. The first group should have 2 students, and they will receive the first envelope. The second group should have 5 students, and they will receive the second envelope. The third group will have the remaining students, and they will receive the third envelope.

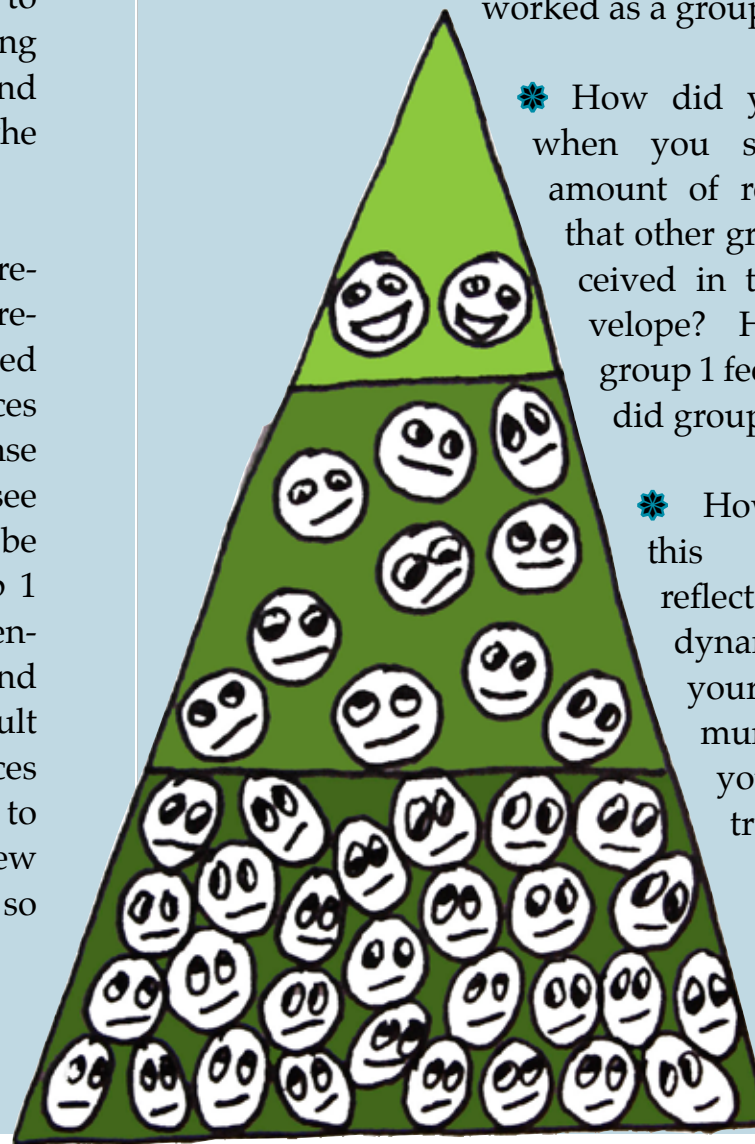
4. Tell the students they cannot open their envelope until they have found a private place to work. Ensure that each group is working in a place where they can't observe the other groups. Let them know that they can use any of the resources in their envelope to create a visual aid for their presentation. They will have 20-30 minutes to prepare their presentation, and then will return to the classroom and present to the other groups.
5. As the groups are working, circulate to each group. Be kind and encouraging to the first group, stern with the second group, and give little attention to the third group.
6. After 20-30 minutes, have everyone return to the classroom to give their presentations. Students should be surprised to see the different amount of resources each group had, and might feel a sense of cheating or injustice when they see how many resources group 1 had, to be shared among so few people. Group 1 might have a visually beautiful presentation, but with little thought behind it. Group 2 might have had a difficult time with an odd number of resources and people. Group 3 most likely had to show the most creativity to use their few resources in an efficient manner with so many people.

7. When each group has finished presenting, facilitate a class discussion about the activity. Some questions to ask include:

- \* Were resources distributed fairly for the activity?
- \* How did your group distribute resources within your group?
- \* How did you incorporate the topic of power dynamics into the way you worked as a group?

- \* How did you feel when you saw the amount of resources that other groups received in their envelope? How did group 1 feel? How did group 3 feel?

- \* How does this activity reflect power dynamics in your community or your country?



## IMAGINE THE WORLD AS A VILLAGE WITH 1000 PEOPLE...

About 330 would not have access to clean, safe drinking water.

200 people would receive three-fourths of the income; another 200 would receive only 2% of the income.

70 people would own an automobile (some of them more than one).

10 people would die each year, 3 of them for lack of food, 1 from cancer.

The village would have 6 acres of land per person, 6000 acres in all of which:

700 acres are cropland

1400 acres are pasture

1900 acres are woodland

2000 acres are desert, tundra, pavement, and other wasteland

The woodland would be declining rapidly, the wasteland increasing; the other land categories would be roughly stable. The village would allocate 83% of its fertiliser to 40% of its cropland – that owned by the richest and best-fed 270 people. Excess fertiliser running off this land would cause pollution in lakes and wells. The remaining 60% of the land, with its 17% of the fertiliser, would produce 28% of the foodgrain and feed 73% of the people. The average grain yield on that land would be one-third the yields gotten by the richer villagers.

~From the Donella Meadows Archive  
at the Sustainability Institute

# Chapter 7: Nonviolence and Cultivation of Diversity

How can we begin cultivating diversity? Intolerance towards diversity is the greatest threat to peace on earth, while the cultivation of diversity is the greatest contribution to peace. We must go beyond mere tolerance and give up our will to control other people and species by seeing the intrinsic value and capacity of the 'other' and creating conditions for self-organisation, self-rule, and self-governance.

The cultivation of diversity is a nonviolent response to the violence caused by globalisation, homogenisation and monocultures. Biodiversity is not just the domain of conservationists; it converges with cultural diversity and embodies diverse cultural and intellectual traditions and how they have co-evolved with nature.

There are two conflicting paradigms of biodiversity. In the first, local communities depend on biodiversity for survival and sustenance. For them, conserving biodiversity means preserving their rights to resources, knowledge and production systems. The second paradigm capitalises on biodiversity for commercial interests and profit. Biodiversity is valued for its material value, and the global commercial intention is to appropriate biodiversity as raw materials - production is based on the destruction of biodiversity.

The conflict between these two paradigms has deepened with the emergence of biotechnologies that manipulate life, and legal systems that favor monopolies over control on living forms. Both trends are towards

uniformity, not diversity. Currently, **transgenic** plants and animals are being produced, which cross species boundaries to make creations that could never occur in nature.

From an ecological perspective, these technological developments are wasteful, hazardous, and unnecessary. Why are we creating new varieties of seeds when we could be preserving the thousands of varieties that are becoming extinct due to monocultures? Why are we experimenting with nature and our bodies when we have seeds that have withstood the test of time? Many existing varieties already serve the function that transgenics are being created to fill - they are nutritious and have evolved to withstand extreme weather conditions particular to their regions. The only reason to continue with GEs is that they are profitable and are encouraged by IPRs.

India has a long history of protesting unjust laws, such as those imposed by the WTO. Gandhi stated the key to Satyagraha, or nonviolent struggle, is self-rule or Swaraj. Swaraj stimulates communities and individuals to free themselves from unjust laws while establishing autonomous governments through intelligent moral and ethical practices. Gandhi's principle of Swadeshi calls for self-sufficiency through the non-violent regeneration and creative reconstruction of communities, both spiritually and materially, by self-liberation from current states of oppression.

In India's struggle for independence, Gandhi used the spinning wheel as a symbol of freedom, not because it was big and powerful but because it was small; it could come alive as a sign of resistance and creativity in the smallest of huts and the poorest of families. In smallness lay its power. Likewise, the seed is a small but powerful symbol, for it embodies diversity, freedom and life.

Let's all plant the seed of social justice, peace and democracy.

## DEFINITIONS

**Transgenic:** Transgenic organisms are created when genes believed to determine specific traits, such as height, tolerance to frost or draught, and protein or fatty acid composition, are spliced into plants from unrelated organisms.



## THE AKTI FESTIVAL

Chattisgarh is the center of diversity of indica varieties of rice. On Akti day farmers worship their diverse paddy varieties at the site of the village diety. The rice varieties are then shared among farmers. The ritual reinforces many core principles of biodiversity conservation:

- \* It is a celebration of diversity
- \* It is a celebration of the renewal of diversity
- \* It reinforces the principle of seed as a shared resource, not private property.

The tribals of Chattisgarh do not merely share their seed with each other. They also share it with other species. In India, birds are not a farmer's enemy, they are his/her friends. Each year at harvest, women weave paddy into beautiful designs to hang up outside their homes during the rains so the birds can eat when they do not find grain in the field.

~ From *Diversity Depletion* by  
P.C. Sinha

# Planting a School Garden

## Objective:

To encourage students to save their own seeds and learn how to plant and harvest their own organic garden.

## Materials:

Seeds from the seed saving activity on page 15  
Soil  
Pots (if necessary)  
Water source  
Organic compost  
Building materials (if necessary)

## Procedure:

1. Encourage your students or school to build their own school garden. Whether in pots, raised beds, or in the ground, a school garden is a great way to increase the students' awareness of and access to local organic food. In addition, a school garden is an excellent platform from which issues on local food security, nutrition and health, and seed saving can be introduced and discussed. This activity is most beneficial if students participate over the course of one growing season. Thus, in order to coordinate this activity into the school calendar, choose to plant crops that are both suitable for the season and your school's specific climate.
2. In determining which seeds to utilize, it might be beneficial to use the seeds saved from the seed savers activity on page 15. This will give students a chance not only to become seed savers, but to become

food and seed producers. Or ask students to research which seeds are indigenous to their region or which seeds have fallen out of popular consumption, such as amaranth or millets. Inquire if these seeds can be obtained from local farmers and suggest that students support the re-growth of those seeds and the expansion of their food biodiversity.

3. Before establishing the garden, engage students in a 'how-to' discussion on creating a school garden. Here, take time to go over the necessary inputs that a school garden will require. One method of approaching this topic is to draw a parallel between cooking a recipe and growing a garden. For example, in describing the components of a garden, including sun, soil, seed, water and life, remind students that just as a recipe requires specific ingredients and instructions to



be followed, so too does a garden. Take time to also address organic methods of fertilising (compost, manure) and pest/fungus management (companion planting, organic treatments).

4. Next, have the students plan the design for their school garden. In doing so, have students discuss and determine the size, location, shape, water capacity and the health of the soil. This will help to define the necessary inputs, such as compost and building materials, and logistical issues, such as a lack of direct sunlight or access to water.
5. In designing the garden space remind students to be creative. This does not have to be a linear space. Integrate artistic patterns into the design such as spirals, the initials of their school or geometric shapes. Utilize different mediums to build the garden. Pots are useful for seasonal herbs. Hanging baskets can be used to grow cherry tomatoes or strawberries. Rooftops can be used to support vines such as squashes and melons. Lastly, garden beds are perfect areas for experimenting with diverse cropping methods, such as companion planting that works to maintain the nutrient balance in the soil. One trick from



Navdanya is to plant pole beans with corn so the bean vines grow up the corn stalks, and are then encircled by pumpkins.

6. Divide gardening responsibilities among the students so they all take turns preparing the soil, planting, watering, and harvesting.
7. When your garden has matured, have a harvesting feast! You can even buy similar vegetables from the market and have a taste test to see how the taste of your vegetables compares to the market varieties.

# Glossary

## **Agrochemical**

Agrochemicals are used in farming to make crops grow more quickly and to kill insects and weeds. Agrochemicals are responsible for killing farmers, fish, helpful insects, plants, birds, and animals that are exposed to the poisons in these chemicals. Soil that is exposed to agrochemicals also becomes unhealthy. When you eat plants that have been sprayed with agrochemicals, you also eat the agrochemicals.

## **Biodiversity**

Also called biological diversity, biodiversity is the variety of different species of plants and animals.

## **Biological Pollution**

Biological pollution is the movement of living organisms, either accidentally or intentionally, from the places where they evolved to new environments where a lack of natural enemies permits their population to explode.

## **Biopiracy**

Biopiracy is the act of exploiting indigenous knowledge of nature for commercial gain with no compensation to the indigenous people themselves.

## **Bioprospecting**

Bioprospecting is the search for plants or animals from which commercially valuable products can be obtained.

## **Biotechnology**

Biotechnology uses biological knowledge to move or change the genes or DNA inside a plant or animal. It can be used to make a plant more resilient to certain weather conditions, like

droughts or floods, or to make high-yielding crop varieties. Biotechnology is also called genetic engineering.

## **Capitalism**

Capitalism is an economic and political system in which a country's industry and trade are controlled by private owners rather than the state.

## **Colonisation**

Colonisation is the process of a dominant ideology imposing economic, political and social values on other societies through the exploitation of human and natural resources.

## **Cross-pollinate**

Cross-pollination occurs when pollen from one plant is mixed with the pollen of a similar plant, in order to create a new plant. It happens in nature, and can also be done by people. Cross-pollination can occur between genetically modified organisms and non-GMOs, which can be dangerous because we do not know the long-term effects of this process.

## **Ecosystem**

An ecosystem is a biological community of interacting and interdependent organisms and their physical environment.

## **Free Trade**

Free trade is a system of trade policy that allows traders to act and / or transact without interference from the government. Free trade can cause small governments to lose the power to make their own environmental and social laws. This means that transnational corporations could gain even more power.

## **General Agreement on Tariffs and Trade (GATT)**

The GATTs were talks between the governments of different countries to make it easier to buy and sell goods between them. The GATT talks began in 1947 and ended in 1995. GATT was followed by the World Trade Organisation (WTO). The GATT was a platform for promoting unrestrained economic control and monopolisation of bio-diverse commons.

## **Genetic Engineering (GE)**

Genetic engineering is the direct human manipulation of an organism's genetic material in a way that does not occur under natural conditions.

## **Genetically Modified Organisms (GMOs)**

A genetically modified organism is a plant, animal, or bacterium that has been changed by scientists so that its genes are different, or genes from another plant, animal or bacterium have been added to it.

## **Globalisation**

Globalisation is the spread of information, business, culture and technology around the world, often through large companies, television, film, and the internet. Global trade agreements like the GATT made it easier to for transnational corporations to sell their goods in many countries, while making it more difficult for local people to sell their goods. Globalisation therefore reduces the control that people have over their culture and way of life.

## **Global South**

The term Global South was originally simply a general description of what was formerly referred to as the Third World, which is primarily in the Southern Hemisphere. Countries comprising the Global South are less economically powerful than those comprising the Global North.

## **Green Revolution**

The Green Revolution was a process of agricultural industrialisation through the spread of high-yielding hybrid crop varieties, which needed high doses of chemical fertilisers, pesticides, herbicides and irrigation in order to produce increased yields.

## **Herbicide**

Herbicides are substances that are toxic to plants, and are used to destroy unwanted vegetation like weeds. Selective herbicides are meant to kill specific targets while leaving the desired crop relatively unharmed.

## **Hybrid**

A hybrid plant or animal has genes from two different species, and has been bred to have particular characteristics.

## **Indigenous knowledge**

Indigenous knowledge is information and understanding that local people have about the place in which they live, including their language, ecosystem, and culture.

## **Intellectual diversity**

Intellectual diversity is the great number of different types of knowledge and ways of acquiring that knowledge.

## **Intellectual Property**

Intellectual Property can be ideas, knowledge or information that belongs to a person or a company. Intellectual Property is created by the mind; it is not material. It is protected under laws called patents. If someone uses patented knowledge without the owner's permission, they can be fined or sued in court. To take out a patent, you need to pay. Big companies can afford these costs to protect their technology and research, but most indigenous knowledge is not protected by patents because they are so expensive.

### **Intellectual Property Rights (IPRs)**

Under intellectual property laws, owners are granted certain exclusive rights to a variety of intangible assets, like artistic works; discoveries and inventions; and words, phrases, symbols and designs.

### **Instrumental value**

Instrumental value is the practical worth of an idea or resource.

### **Intrinsic value**

Intrinsic value is the permanent and inherent worth of an idea or resource, separate to its monetary price.

### **Knowledge systems**

Knowledge systems are sets of connected facts, information, and skills acquired by a person or a group of people through experience or education.

### **Life sciences**

Life sciences are the sciences concerned with living organisms.

### **Monoculture**

Monoculture is the cultivation of one kind of plant in a particular area. Monoculture is not natural; in nature, many different plants grow together, taking some nutrients from the soil, water and air, and giving others back. This helps keep the earth in balance. When we cultivate only one type of plant, it takes up all of some nutrients, but leaves others in excess. This makes the earth unbalanced. Monocultures are also more vulnerable to pests and diseases.

### **Monopoly**

A monopoly is the exclusive possession and control of something. In the political and economic system of capitalism, a person or company can have exclusive possession and control of a supply

or trade in a particular commodity or service.

### **Monsanto**

Monsanto is a US-based multinational biotechnology corporation. It is the leading producer of genetically engineered seed and provides the technology in 90% of the world's genetically engineered seeds.

### **Multinational Corporations (MNCs)**

Multinational Corporations are corporations or enterprises that deliver services in more than one country. Many impose a free trade economic system on the Third World to make these countries unable to build their own economy. The 200 richest corporations have more money than almost all the countries of the world combined.

### **Natural resources**

Natural resources are naturally occurring materials or substances such as minerals, forests, water and fertile land that some people and companies use for economic gain. They can be appreciated for the instrumental or intrinsic value.

### **Organic**

If something is organic, it is or was living, or part of living matter.

### **Organic farming**

Organic farming uses only things that come from nature. It grows plants without the use of chemicals to kill pests or weeds, and without using chemical fertiliser.

### **Patent laws**

Patent laws are government authorities to a person or a company, which gives them the right to use or sell an invention or idea.

### **Privatisation**

Privatisation is the transferring of a business, industry or service from public to private ownership.

### **Reductionism**

Reductionism is the practice of simplifying something complex to individual parts.

### **Red Revolution**

The Red Revolution is the name given to the spread of communism during the Cold War. The threat of a revolution was used to justify the economic, political, and social control of rural development strategies and the Green Revolution.

### **Species**

Species are one of the groups into which scientists divide living organisms consisting of similar individuals that are able to exchange genes and interbreed.

### **Structural violence**

Structural violence describes situations where unfair access to political, economic, and other kinds of resources and power is sustained or exacerbated because of repressive structures.

### **Super weeds**

Super weeds are made when the genes from a plant that has been genetically engineered to stop poisons from harming it are mixed with the genes of a local plant. Super weeds are difficult to kill because they are resistant to some pesticides and herbicides.

### **Sustainability**

Sustainability is the capacity to endure. In ecology, the word describes how biological systems remain diverse and productive over time.

### **Third World**

Third World is the term used for the countries of Asia the Caribbean, South and Central America, and Africa, that are less industrially developed and less powerful. The term was first used in the Cold War for countries not closely connected with

the capitalist west (the First World) or with the communist east (the Second World).

### **Trade Related Intellectual Property Rights Agreement (TRIPS)**

TRIPS is an international agreement to give companies more power to own and sell ideas and information. The TRIPS Agreement makes patent laws stronger and gives transnational corporations the power to own genetic information, seeds and new technology.

### **Transgenic**

Transgenic organisms are created when genes believed to determine specific traits, such as height, tolerance to frost or draught, and protein or fatty acid composition, are spliced into plants from unrelated organisms.

### **Western knowledge**

The term West is used to refer to countries in Western Europe and North America. Western knowledge includes the dominant cultural, economic and political systems of this region, which are often imposed upon non-Western countries and cultures.

### **World Trade Organisation (WTO)**

The WTO is a powerful organisation in which governments make agreements about trade between countries and transnational corporations. The WTO was set up after GATT to increase free trade between countries. The WTO rules make trade for rich countries easier, while making trade for poor countries more difficult.

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