

DRUG POLICY ALLIANCE

Reason. Compassion. Justice.

REPEATING MISTAKES OF THE PAST: ANOTHER MYCOHERBICIDE RESEARCH BILL

**MYCOHERBICIDES HAVE ALREADY BEEN STUDIED
AND REJECTED FOR DRUG CONTROL**

**REPEATING SUCH STUDIES IN FOREIGN COUNTRIES
WOULD BE WASTEFUL OF TAXPAYER MONEY AND PERCEIVED WIDELY AS
BIOLOGICAL WARFARE**

A REPORT BY THE DRUG POLICY ALLIANCE

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Jeremy Bigwood for the Drug Policy Alliance

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Headquarters
70 WEST 36TH STREET
16TH FLOOR
NEW YORK, NY 10018
P (212) 613-8020

Office of National Affairs
925 15TH STREET
SECOND FLOOR
WASHINGTON, D.C. 20005
P (202) 216-0035

WWW.DRUGPOLICY.ORG

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A REPORT BY THE DRUG POLICY ALLIANCE

EXECUTIVE SUMMARY

The U.S. House of Representatives recently passed a provision attached to the Office of National Drug Control Policy Reauthorization Act of 2006 (H.R. 2829) requiring that Mycoherbicides – toxic mold-like fungi that attack plants and other life forms, including mammals – be tested in field studies and used against drug crops in foreign drug-producing countries, such as Colombia and Afghanistan. The bill's authors insinuate that the use of mycoherbicides against drug crops has not been adequately studied, which is completely false.

As a vote in the Senate nears (expected sometime in April 2006) the following should be considered:

- The use of mycoherbicides against drug crops has already been studied and rejected by every U.S. government agency that has ever worked with them. They were also rejected by the Andean Community of Nations and the United Nations because of their non-selectivity, mutagenicity and environmental toxicity on plants, people and microorganisms found in the soil;
- The proposed research is duplicative, holds no promise of success, and represents therefore a massive waste of millions of taxpayer dollars; and
- The proposed unilateral deployment of mycoherbicides by the United States in foreign countries would be perceived globally as biological warfare, and would likely increase support for the insurgencies in Colombia and Afghanistan.

Given all of the evidence against mycoherbicides, they should not even be considered for use by the U.S. government. In fact, the Mycoherbicides in question – *Fusarium oxysporum* and *Pleospora papaveracea* – have been thoroughly researched since the 1970s. The proposed amendment is extremely reckless and ignores some thirty years of scientific studies conducted by several U.S. and foreign government agencies on the use of mycoherbicides for drug crop eradication, both in the laboratory and the field.

In each case, these mycoherbicides have been studied and rejected as far too unpredictable and unsafe for drug control by every U.S. government agency that has studied them, including the Central Intelligence Agency, the Drug Enforcement Administration, the State Department and the Department of Agriculture. These toxins have even been “weaponized” - tested, mass-produced

and stockpiled in the past by the major powers for use as chemical warfare agents.

Mycoherbicides are considered “toxigenic” because they synthesize and secrete chemical toxins known as “mycotoxins” which attack their targets and even non-target organisms by dissolving their cell structures. As such they are “living chemical factories,” that produce toxins that can linger in the environment for long periods of time –months and even years.

The mycoherbicides proposed for drug crop eradication contain toxins associated with chemical and biological warfare and have been shown to be toxic to various forms of life.

The fungi themselves can mutate and change hosts, causing damage to other crops. Like any epidemic, mycoherbicides can migrate to areas beyond where they were originally used.

Furthermore, there are already strains of the target coca crops that are resistant to mycoherbicides. If mycoherbicides were used against such resistant plants, they would not kill those plants but may kill off other crops, including food crops, and affect animal and human health.

If it becomes law, this bill will likely have very deleterious consequences for the United States and its relations with the rest of the world. The Andean Community of Nations (including Colombia), and the United Nations rejected mycoherbicides for drug crop eradication because of their non-selectivity, mutagenicity and environmental toxicity on plants, animals and microorganisms found in the soil. The proposed unilateral deployment of mycoherbicides by the United States in foreign countries would be perceived globally as biological warfare and considered a violation of the Biological Weapons Convention (BWC), and may increase support for the insurgencies in Colombia and Afghanistan.

We urge the Senate to pass no bill requiring that the U.S. government retest mycoherbicides in other countries and respectfully suggest that Senators remove the mycoherbicide provision from the 2006 the Office of National Drug Control Policy Reauthorization Act in conference committee.

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FIRST EDITION

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BACKGROUND:

The House of Representatives recently passed an amendment to the Office of National Drug Control Policy Reauthorization Act of 2006 (H.R. 2829) regarding the use of mycoherbicides¹ – toxic fungi – against drug crops. The amendment reads:

“No later than 90 days after the date of enactment of this Act, the Director of the Office of National Drug Control Policy shall submit to the Congress a report that includes a plan to conduct, on an expedited basis, a scientific study of the use of mycoherbicide as a means of illicit drug crop elimination by an appropriate Government scientific research entity, including a complete and thorough scientific peer review. The study shall include an evaluation of the likely human health and environmental impacts of such use. The report shall also include a plan to conduct controlled scientific testing in a major producing nation of mycoherbicide naturally existing in the producing nation.”²

The proposed amendment is extremely reckless and ignores the following facts:

Scientific studies using mycoherbicides for drug crop eradication have been ongoing for some thirty years, both in the laboratory and in the field. The results are in and there is no need for further study.

- Mycoherbicides kill plants and other life forms by producing harmful toxins.
- The chemical toxins produced by mycoherbicides have been tested and stockpiled in the past as chemical warfare agents.
- The use of mycoherbicides against drug crops has already been rejected by every U.S. government agency that has worked with them, as well as the Andean Community of Nations (including Colombia), and the United Nations because of their non-selectivity, mutagenicity and environmental toxicity on plants, animals (including humans), and microorganisms found in the soil.
- The proposed deployment of mycoherbicides by the United States in foreign countries would be perceived globally as biological warfare and considered a violation of the Biological Weapons Convention (BWC).
- The deployment of mycoherbicides in field studies implies a known risk of these toxic experimental agents escaping outside the test area(s) with potentially dire consequences.
- The governments, news media and populations of Colombia and Afghanistan where these studies are being proposed will continue to object to being part of biological experiments involving known toxic agents.

- The unilateral use of mycoherbicides by the U.S. government against drug crops in Colombia and Afghanistan will likely increase support for the insurgencies there.

WHAT PROMPTED THIS REPORT?

The U.S. House of Representatives recently passed a provision attached to a bill requiring that toxic fungi called mycoherbicides be used against drug crops in foreign countries. If it becomes law, this bill will have very deleterious consequences for the United States and its relations with the rest of the world.

The authors of the provision recommended that there be field studies using mycoherbicides in drug-producing countries, such as Colombia and Afghanistan.³ Language used by the bill's authors also insinuates that the use of mycoherbicides against drug crops has not been adequately studied,⁴ which is utterly false. The mycoherbicides developed for use against drug crops have been studied by several U.S. and foreign government agencies for the last thirty years in both the laboratory and the field. In every case, these mycoherbicides have been found to be unpredictable and unsafe for drug control by each and every U.S. government agency that has studied them.

What follows is a brief overview of what is known about mycoherbicides.

WHAT ARE MYCOHERBICIDES AND WHY ARE THEY BEING PROPOSED TO ELIMINATE DRUG CROPS?

Mycoherbicides are mold-like fungi that attack plants and other life forms, including mammals. The major species of fungi that have been proposed as mycoherbicides for use against drug crops are strains of *Fusarium oxysporum* and *Pleospora papaveracea*. Both *Fusarium oxysporum* and *Pleospora papaveracea* have been thoroughly researched since the 1970s.

Mycoherbicides are considered “toxigenic,”⁵ because in all cases they attack their targets or even non-target organisms – both plant and animal – through the synthesis and secretion of chemical toxins, called “mycotoxins.” When the fungus encounters a target life form, such as a plant root, it secretes these mycotoxins which dissolve the target’s cell walls. The fungus then ingests the liquefied contents of the target cell and reproduces itself, moving into the dead cell space as an uninvited and deadly guest.

From there it produces more mycotoxins and repeats the process with adjacent cells until it has taken over a substantial area of the plant. Since the fungus usually attacks plants through the roots, it soon blocks the stem causing the plant to wither and die. Unlike chemical herbicides which are made in a factory, applied to plants, and then degrade (some faster than others), mycoherbicides

can be considered as “living chemical factories,” lingering in the environment for long periods of time – months and even years.

In the case of animals that become infected with the living fungus, a similar process takes place – the mycotoxins dissolve the cell walls and the fungus imbibes their contents and occupies the dead cell. When this takes place in humans, it is called “Fusiarosis.”^{6,7} *Fusarium oxysporum* infection is especially dangerous in immunocompromised humans. It is associated with a high mortality rate,⁸ and is one of the reasons the Drug Enforcement Administration (DEA) got out of mycoherbicide research.⁹

The cell-dissolving “mycotoxins” that are produced by the proposed mycoherbicides were initially discovered after hundreds of thousands of people in the Soviet Union died due to internal hemorrhaging after eating bread made from *Fusarium*-contaminated overwintered grain during the mid-1940s.¹⁰ Soviet scientists isolated and identified the responsible *Fusarium* species, and they and others cultivated it, and extracted from it a new series of mycotoxins that were named the “trichothecene” toxins, one of which, “T-2 toxin” is often found in *Fusarium oxysporum*.^{11,12}

During the Cold War these potent and chemically stable trichothecene mycotoxins from *Fusarium* and related species were tested on a series of animal subjects.^{13,14,15,16,17} Various means of delivery, such as aerosol sprays, were also investigated.¹⁸ In mammals, it was found that these mycotoxins would cause necrosis and bleeding to whatever part of the body they were applied. Later, these toxins were “weaponized” – mass-produced and stockpiled by the major powers for use as chemical warfare agents.^{19,20,21}

Fumonisin, another *Fusarium oxysporum* mycotoxin, was in the news a few years ago because people living along the Rio Grande River in Texas had been eating *Fusarium*-contaminated corn tortillas. This resulted in a slew of children born brainless and/or with other birth defects.^{22,23}

There are other diseases associated with mycotoxins. One of these is Kashin-Beck disease (KBD), a chronic osteoarthritic disease, endemic in parts of China. KBD is associated with exposure to eating grain contaminated with *Fusarium oxysporum*.^{24,25}

In order to safeguard their populations, government agencies all over the world, including the U.S. Department of Agriculture (USDA), monitor grains and corn to ensure these fungi or the toxins they produce do not contaminate food supplies.²⁶ There are standards for the maximum allowable amounts of mycotoxins that can be found in commercial grains and other foods available to the public. Clearly, it will be problematic for the U.S. government, which controls mycotoxins in its own food supply, to begin a program of spraying mycoherbicides containing these same mycotoxins in other countries.

THE LONG HISTORY OF MYCOHERBICIDE RESEARCH:

The mycoherbicide *Fusarium oxysporum* and coca

In 1964, a wilt epidemic broke out amongst coca plants at the Coca-Cola coca research plantation on the Hawaiian Island of Kauai.²⁷ Successive dying and dead plants were removed from the plantation and these were replaced with healthy coca seeds or seedlings, which also withered and died. Policy analysts and scientists thought this coca disease – whatever it was – could be the silver bullet that would eliminate the drug at its source and stem the sharp rise in cocaine use since the early 1970's in the United States.

During the 1980's, *Fusarium oxysporum* was identified as the wilt organism by scientists contracted by the Central Intelligence Agency (CIA), who went on to develop the means to mass produce it so that it could be applied to South America's coca fields. The origin of the *Fusarium* that attacked the coca in Hawaii was never clearly established. Did it originate with imports of seedlings and seeds plants from South America or was it a native Hawaiian strain that had formerly attacked other species of plants and had mutated to prey on coca?

By 1986, the Agricultural Research Service (ARS) of the USDA was openly developing biological agents to kill coca, including fungi (this research also included a program using moth pupae that never got off the ground). The USDA/ARS program took over and repeated the CIA's clandestine work on *Fusarium*, "legitimizing" it so that it would no longer be considered clandestine. This meant the research could be openly funded by Congress in the future and its results published in the scientific literature. Other, still clandestine work on mycoherbicides was being carried out by the U.S. Department of Energy in Washington State.²⁸

In 1987, after the USDA/ARS took over the Kauai site, a strain of *Fusarium oxysporum* called "EN-4" was isolated from *Erythroxylum novogranatense*. *Erythroxylum novogranatense* is not the same species as the target coca plant, *Erythroxylum coca*. The fact that this "EN-4" strain was first isolated from a species other than the main target species illustrates some of the problems of mycoherbicide selectivity. *Fusarium oxysporum*, like other mycoherbicides is not selective and will also attack other plants. A British study using the same *Fusarium* strain also attacked a series of plants completely unrelated to coca.²⁹

The *Fusarium* outbreak in Peru

In 1984,³⁰ one year after the CIA had started funding research in Hawaii, a *Fusarium* epidemic of coca started in the Huallaga Valley of Peru. Many believe the epidemic in Peru was "natural," but others disagree, and many of the region's inhabitants blame the United States for the disease.³¹ Indeed, some of the same scientists who were working on the Hawaiian project were also later working in Peru. Whether the epidemic was "natural" or not, it will serve us here to illustrate the many ill effects that can proceed from a *Fusarium* epidemic.

By 1987, the first Peruvian press reports appeared documenting how a plant disease they named “seca-seca” was attacking the coca and other plants in the Upper Huallaga Valley.³² At the time they did not know what caused it.

According to a locally financed study by Peruvian investigator Enrique Arévalo (who later went on to follow the fungal epidemic for the USDA), the Huallaga *Fusarium* fungus attacked up to 70 percent of the coca plots in some areas. He also noted that it attacked many other plant species. One of the more interesting experiments the Arévalo team carried out was to extract *Fusarium* mycotoxins from the coca-killing strain of *Fusarium oxysporum* and apply these in different dosage levels to various plants, coca and non-coca. All of the plants that received this aqueous mycotoxin fraction died, proving that the *Fusarium* mycotoxins are non-specific - they will kill or impede the growth of many plants, not just the target plant.³³

And, as the following State Department cable explains, there was also apparently the problem of soil poisoned by mycoherbicides.³⁴

Meanwhile, reportedly 3,000 farmers in the Tingo María and Leoncio Prado area... have had to scratch for other means of earning a living; including panning for gold, when a plant disease, "seca-seca," which had previously attacked coca plants broke out again in alternate crops planted in former coca beds.³⁵

The “poisoned soil syndrome” is a problem that had already been studied by the Soviet scientists investigating the deaths of their compatriots during the *Fusarium* epidemic there during WWII. In laboratory experiments, they had found that even after the fungus was no longer present in the soils its toxins were still active, stunting the growth or even killing off new plants of any species planted in those soils for up to several years afterwards.³⁶

By 2000, the *Fusarium* epidemic in the Huallaga had run its course and very few plants were still dying from it – those that survived were mostly resistant to it. Taking advantage of this, Colombian cocaine merchants bought seeds and seedlings from the strains that had survived the Peruvian *Fusarium* epidemic for planting and crossbreeding in Colombia, in the belief that these plants would be immune to any *Fusarium* formulations that could be sprayed by the U.S. as part of “Plan Colombia.” These strains are still grown throughout Colombia and if they were sprayed by *Fusarium oxysporum* there is a good chance that they would survive the mycoherbicide. The USDA/ARS is aware of “*Fusarium*-resistant coca” and maintains samples of coca that are resistant to *Fusarium oxysporum*.³⁷

Finally, smaller amounts of the already-used glyphosate formulations are needed to kill coca than *Fusarium oxysporum* formulations, which in the laboratory only kill some forty percent of the target species.³⁸

Fusarium against marijuana

During the mid-1970s with funding from the USDA, A.H. McCain and D.C. Hildebrand of the University of California at Berkeley were working with another strain of *Fusarium oxysporum* as a mycoherbicide against *Cannabis*. They were

able to mass produce an inoculum, and a series of experiments with various strains of *Fusarium oxysporum* continued until the turn of the century.^{39,40,41,42,43,44,45}

By 1989, the scientists researching *Fusarium* and marijuana already knew about the problem of *Fusarium* in immunocompromised subjects. In a letter to the DEA on March 10, 1989, one of them states: “this fungus is only a problem in immunocompromised patients.”⁴⁶ *Fusarium*, not just the mycotoxins it produces – can be very dangerous and infect immunocompromised animals, including humans. Strains of the living fungus can infect people, too. Immunocompromised individuals – people having an immune system that has been impaired by disease or treatment, which can include people who are malnourished, HIV - infected patients, burn and trauma victims, and the elderly – are all at risk of becoming infected by the constantly mutating fungus.⁴⁷ Even in first-world hospitals, immunocompromised patients with *Fusarium* infections have a less than 50 percent chance of survival.⁴⁸ One medical handout reads: “*Fusarium* in the foot: Remove the foot!”⁴⁹

During the spring and summer of 1999, Colonel Jim McDonough, a former top aide to then U.S. Drug Czar General McCaffrey, who had taken a new job as Florida’s top drug official - tried to sell the idea of using *Fusarium oxysporum* to control Florida’s burgeoning outdoor marijuana industry.

The concept was not well received, as Florida has a long history of imported organisms taking over the environment. David Struhs, the head of Florida’s Department of Environmental Protection, reacted with a strongly cautionary letter saying: “*Fusarium* species are capable of evolving rapidly... Mutagenicity is by far the most disturbing factor in attempting to use a *Fusarium* species as a bioherbicide.

It is difficult, if not impossible, to control the spread of *Fusarium* species. The mutated fungi can cause disease in a large number of crops, including tomatoes, peppers, flowers, corn and vines, and are normally considered a threat to farmers as a pest, rather than as a pesticide. *Fusarium* species are more active in warm soils and can stay resident in the soil for years. Their longevity and enhanced activity under Florida conditions are of concern, as this could lead to an increased risk of mutagenicity.” And mutation permits these fungi to attack other plants. The greater the size and concentration of the mycoherbicide, the greater chance there is for mutation.⁵⁰

Having been rebuffed by the state of Florida - mainly on the mutation issue - failing even to convince the state authorities to initiate a simple experiment in a quarantined test site, the mycoherbicide program against marijuana in the United States was shelved.

However, for a decade starting around 1988 U.S. mycoherbicide proponents were able to convince the cash-strapped Soviet republic of Kazakhstan to conduct experiments with U.S. funding, both in the laboratory and in the field.⁵¹ None of this work proved successful.

Pleospora mycoherbicide against opium poppy

The Soviet Union maintained a program of using both *Fusarium* species and *Pleospora* as mycoherbicides against opium poppy from the 1970's onward at its biowarfare center, the Institute of Plant Genetics in Tashkent, Uzbekistan. For much of the Cold War, this center had "the specific objective of targeting and destroying U.S. and allied grain crops, specifically wheat."⁵²

From 1998 to 2001, after the fall of the Soviet Union, the U.S. and the U.K. funded a United Nations Office of Drug Control Policy (now known as the United Nations Office of Drugs and Crime – UNODC) project there and in Kyrgyzstan using *Pleospora papaveracea* against opium poppy. USDA/ARS also studied *Pleospora* in field trials at Ft. Detrick, Maryland. In both the Uzbekistan and Ft. Detrick studies, *Pleospora* was found to be "not impressive."⁵³ Smaller volumes of formulations of the chemical herbicide glyphosate were deemed cheaper and better for killing poppy than formulations of *Pleospora papaveracea*.

Upon initiation of the Uzbekistan investigation it was found that the *Pleospora* caused "respiratory problems" amongst the scientists and their assistants.⁵⁴ While the *Pleospora papaveracea* mycotoxins have not been fully identified, "some of the phytotoxic chemicals produced by the fungus are similar to compounds known to have some harmful effects in man," according to UNODC's top scientist, Dr. Howard Stead.⁵⁵ Furthermore, a USDA document states that there are "[M]ajor concerns regarding human safety and biotoxins."⁵⁶ *Pleospora papaveracea*, like *Fusarium oxysporum*, is clearly unsafe for use around humans.

As is the case for *Fusarium oxysporum*, *Pleospora papaveracea* is not selective. It was found capable of attacking various species of poppy, including the Oriental poppy, a favorite of gardeners throughout the world.⁵⁷ If it were to be used in Afghanistan, it could theoretically spread to India, which is the source of much of the world's legitimate medical opium supply.⁵⁸

The most virulent strain of *Pleospora papaveracea* is a genetically-modified version and contains a gene from *Fusarium oxysporum*.⁵⁹ As a genetically-modified organism (GMO), this is something many of our 'anti-GMO' NATO allies will not accept for deployment in Afghanistan.

Previous legislation in the U.S.

In 1998, Senate bill S.2522, the Western Hemisphere Drug Elimination Act, which authorized \$23 million for a three-year "Master Plan for Mycoherbicides to Control Narcotic Crops" was passed by Congress. A year later, Plan Colombia – counternarcotics and counterinsurgency aid to the Colombian government - was framed. An integral part of Plan Colombia was that the Colombians would use *Fusarium* against coca crops. Governments, the news media and NGOs throughout Latin America balked at the U.S. plan, which was passed in August 2000.

Before Plan Colombia passed Congress, mycoherbicides had been the subject of a June 2000 National Security Council (NSC) meeting. NSC members expressed concern that the use of mycoherbicides in Colombia could be perceived as U.S. unilateral entry into biological warfare, and there was fear of setting this precedent and of possible responses to it. As a result, when President Clinton signed the Plan Colombia legislation into law, he waived the use of mycoherbicides there.⁶⁰

While the National Environmental Policy Act (NEPA) may not apply to U.S. government activities overseas, Executive Order 12114 mandates all federal agencies to conduct environmental assessments, public hearings and a published finding of “no significant impact” on proposed overseas activities that may have a potential environmental impact.

Rejection of *Fusarium oxysporum* as a drug crop control agent in Latin America

In Lima, Peru on September 5 and 6, 2000, at the Andean Community (comprised of delegations from Bolivia, Colombia, Ecuador, Peru and Venezuela), the Andean Committee of Environmental Authorities (CAAAM),¹ declared its “rejection of the use of the fungus *Fusarium oxysporum* as a tool for the eradication of illicit crops in the territory of the member countries of the Andean Community.” This essentially prohibits the use of *Fusarium oxysporum* against coca throughout the region.⁶¹

Additionally, Bolivia, Ecuador and Peru have prohibited the use of anything other than manual eradication through law or presidential edicts. The Colombian government has continually expressed that it does not want mycoherbicides used within its territories.

Afghanistan

President Karzai has stated repeatedly that he is unwilling to consider anything other than manual eradication of opium poppy.⁶² The *Pleospora* mycoherbicide is historically associated with the Soviets.⁶³ To allow such tainted technology into the present Afghanistan situation would only assist in further destabilizing the situation there.

The Biological Weapons Convention

While mycoherbicides contain chemical toxins, they are actually covered under the Biological Weapons Convention (BWC) rather than the Chemical Weapons Convention.⁶⁴ Given that mycoherbicides are biological agents it has been argued that their use, especially in foreign countries, would be illegal under the BWC.^{65, 66} This is one of the reasons why President Clinton waived the use of mycoherbicides in Colombia when he signed Plan Colombia.⁶⁷

What U.S. government officials have said about mycoherbicides:

John Walters, Drug Czar

During his Congressional testimony before the House International Affairs Committee on May 11, 2005, John Walters said: ...“Because the controversy around mycoherbicides is such that it is likely to create an environment of – when we already have an effective herbicide [Roundup] – concern about other agents being introduced to the environment. The Colombian government has also said that it is not interested [in mycoherbicides]. Again, it is not clear that this particular organism is specific to coca... If you were to spray it – and it is not specific to coca – it could cause considerable damage to the environment which in Colombia is very delicate. In order to start testing this [mycoherbicide] in an open area, it is suggested that one would be using it... Again, when you spray a foreign substance in areas where people are farming – in proximity to people and farm animals, you have to be sure it is safe. And... if you are going to do this in a democratic environment, you have to have the people’s confidence that it is safe...”

Eric Rosenquist, USDA/ARS, Senior National Program Leader

Eric Rosenquist has followed drug control for many years. Here are some of the things he has said about biocontrol:

- “From 1990 through 1998, ARS, and its cooperators, screened large numbers of candidate control organisms for both coca and illicit poppy. None were demonstrated to be safer or more effective than commercially-available chemicals now used for narcotics control.”⁶⁸
- “USDA cannot support the biocontrol of narcotic plants.”⁶⁹
- “Any proposed application of biological control will be opposed by environmental and advocacy groups both in the U.S. and overseas. It will definitely be portrayed as biological warfare, as it has been portrayed in the past.”⁷⁰
- “No country in the Western hemisphere has been willing to allow field trials and/or evaluation of candidate biological control organisms for the control of illicit crops.”⁷¹
- “ARS and the Department of State have already demonstrated that glyphosate is a safe, effective control agent for illicit coca, with minimal adverse environmental effects.”⁷²
- “Opium is also an important legal crop and critical to the world pharmaceutical supply. *Pleospora* is highly ineffective and may adversely impact licit cultivation.”⁷³

The CIA has been against the use of mycoherbicides on drug crops since at least 2000. One official stated to the *New York Times*: “I don't support using a product on a bunch of Colombian peasants that you wouldn't use against a bunch of rednecks growing marijuana in Kentucky.”⁷⁴

The State Department is also against using mycoherbicides for drug crop eradication.⁷⁵ In fact, there is not a single U.S. government agency that is supportive of the use of mycoherbicides against drug crops.

CONCLUSIONS AND RECOMMENDATIONS:

The mycoherbicides developed for use against drug crops have been studied by several U.S. and foreign government agencies for the last thirty years in both the laboratory and the field. Each time, researchers rejected mycoherbicides as unsafe and too unpredictable for drug control. Executive Order 12114 mandates all federal agencies to conduct environmental assessments, public hearings and a published finding of “no significant impact” on proposed overseas activities that may have a potential environmental impact. Clearly, it will be problematic for the U.S. government, which controls mycotoxins in its own food supply, to begin a program of spraying mycoherbicides containing these same mycotoxins in other countries.

Mycoherbicides are illegal under the Biological Weapons Convention, especially in foreign countries; President Clinton waived the use of mycoherbicides in Plan Colombia for precisely this reason. The Andean Community, through the Andean Committee of Environmental Authorities, flatly rejected the use of *Fusarium oxysporum* for drug crop eradication throughout the region. Afghanistan President Karzai has also repeatedly stated he is unwilling to consider anything other than manual eradication of opium poppy.

The mycoherbicides proposed for drug crop eradication have been shown to be toxic to various forms of life. They have also been shown to mutate and cause damage to other crops. They can migrate to areas other than where they were originally used and contain toxins associated with chemical and biological warfare. Furthermore, there are already strains of the target crops that are resistant to mycoherbicides. Given all of the evidence against mycoherbicides obtained during over thirty years of study, they should not even be considered for use by the U.S. government.

We urge the Senate to pass no bill requiring that the U.S. government retest mycoherbicides in other countries and suggest that Senators remove the mycoherbicide provision from the 2006 the Office of National Drug Control Policy Reauthorization Act in conference committee.

¹ We use the term “mycoherbicide” here to describe the toxic fungi designed to be used against drug crops. “Myco” = fungal, “herbicide” = plant killer. However, other terms, such as “Agent Green” have been used to describe these fungi (see the work of the Sunshine Project at <http://www.sunshine-project.org/>). We are not using the term “Agent Green” here because it could be confused with a chemical herbicide known by that name, which was widely used during the Vietnam conflict. The erroneous term “microherbicides” has also

been used repeatedly by both a Congressman supportive of the toxic fungi and a Colombian news media outlet; that term is a misnomer and will not be used here.

² Reps. Dan Burton and Mark Souder slipped the provision “Requirement for Scientific Study of Mycoherbicide in Illicit Drug Crop Eradication” into the House Government Reform Committee’s draft of the Office of National Drug Control Policy Reauthorization Act (H.R. 2829), June 16, 2005

http://thomas.loc.gov/cgi-bin/cpquery/?&dbname=cp109&sid=cp109gre9Q&refer=&r_n=hr315p1.109&item=&sel=TOC_11342&

³ Apart from Afghanistan and Colombia, there are many other countries where there is major illicit drug crop production. Theoretically, if this provision becomes law, all of these countries’ ecosystems could be threatened.

⁴ The idea for the new mycoherbicide bill came about after a Congressional aide read a fanciful article on the Internet titled “The Mystery of the Coca Plant That Wouldn’t Die: The war on Colombia’s drug lords is losing ground to an herbicide-resistant supershrub. Is it a freak of nature – or a genetically modified secret weapon?” Wired website, November, 2004 [http://wired-](http://wired-vig.wired.com/wired/archive/12.11/columbia.html?pg=5&topic=columbia&topic_set)

[vig.wired.com/wired/archive/12.11/columbia.html?pg=5&topic=columbia&topic_set](http://wired-vig.wired.com/wired/archive/12.11/columbia.html?pg=5&topic=columbia&topic_set). The article alleges that glyphosate, the chemical herbicide being used to kill coca in the U.S.-sponsored eradication program in Colombia doesn’t work anymore, because narco-traffickers have developed a “glyphosate-resistant coca.” While it is possible that a strain of coca exists that is resistant to glyphosate formulations, there is no proof of this in the scientific literature or at USDA or the State Department’s INL. Were such a strain to be proven to exist, the next logical step would be manual eradication or eradication with other chemical herbicides, not the quantum leap to mycoherbicides.

⁵ Literally “toxin-producing” because these fungi synthesize and secrete toxic compounds.

⁶ Diagnosis and Management of Fusariosis, Medscape, Elias Anaissie, MD, University of Arkansas for Medical Sciences, Little Rock, http://www.medscape.com/viewarticle/463081_1.

⁷ Fusariosis – Amenzando la Salud. Dr. Oswaldo Jave, PowerPoint, Quito, October, 2000.

⁸ “*Fusarium* in the foot: Remove the foot!” reported a surgical guide from the Medical School at Washington University in St. Louis.

⁹ Letter from Dr. David Sands to DEA on March 10, 1989, obtained through the Freedom of Information Act.

¹⁰ “Toxigenic *Fusarium* Species: Identity and Mycotoxicology” W.F.O. Marassas, Paul E. Nelson, and T.A. Tousson. Pennsylvania State University Press, University Park and London, 1984.

¹¹ Ibid.

¹² Assessment of the Efficacy of Activated Charcoal for Treatment of Acute T-2 Toxin Poisoning. Fricke, Robert F. and Jorge, Juan M.

¹³ A High-Performance Liquid Chromatographic Method for Determining 3-HT-2 and its Metabolites in Biological Fluids of the Cynomolgus Monkey. Naseem, Syed M.; Pace, Judith G.; Wannemacher, Robert W., Jr. Army Medical Institute of Infectious Diseases, Fort Detrick, MD, June, 1995.

¹⁴ Effects of Trichothecenes on Cardiac Cell Electric Function Annual Report, October 1983-September 1984, Woods, W.T. Jr., Alabama University, Birmingham, September 1984.

¹⁵ Acute Trichothecene Intoxication in Animals. Bunner, D.L.; Wannemacher, R.W.; Parker, G.W.; Neufeld, H.A.; Pace, J.G. Pan American Health Organization, Washington, D.C., 1986.

¹⁶ Detection and Quantification of T-2 Mycotoxin in Rat Organs by Radioimmunoassay. Hewetson, John F.; Pace, Judith G.; Beheler, Joanne E. Army Medical Research Institute of Infectious Diseases, Fort Detrick, Maryland, 1987.

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- ¹⁷ Diagnosis and Management of Trichothecene Toxicosis in the Swine Model. Annual Report 1, July 1985 – September 1986 Buck, William B.; et al. December 1986 Illinois University at Urbana. College of Veterinary Medicine, December 1986.
- ¹⁸ Comparative Acute Inhalation Toxicity of a Saline Suspension and an Ethanol Solution of T-2 Mycotoxin in Mice. Creasia, D.A.; Thurman, J.D. Army Medical Research Institute of Infectious Diseases, Fort Detrick, MD, 1993.
- ¹⁹ US Department of Defense. *Potential Military Chemical/Biological Agents and Compounds*. Washington, D.C.: Headquarters, Departments of the Army, Navy, and Air Force; 1990. Field Manual 3-9, Air Force Regulation 355-7, NAVFAC P-467.
- ²⁰ Federation of American Scientists Biological Weapons List <http://www.fas.org/nuke/intro/bw/agent.htm#b16>.
- ²¹ Protection Against Trichothecene Mycotoxins, National Research Council, Washington, D.C., 1983.
- ²² “Corn toxin examined in border birth defects: Diet may have put Hispanics at risk” Laura Beil, *The Dallas Morning News*, March 4, 2001.
- ²³ “Maternal fumonisin exposure and risk for neural tube defects: Mechanisms in an in vivo mouse model.” Gelineau-van Waes, Janee; Starr, Lois; Maddox, Joyce; Aleman, Francisco; Voss, Kenneth A.; Wilberding, Justin; Riley, Ronald T. Department of Genetics, Cell Biology, and Anatomy, University of Nebraska Medical Center, Omaha, Nebraska & Toxicology and Mycotoxin Research Unit, U.S. Department of Agriculture Agricultural Research Service, Athens, Georgia. Birth Defects Research Part A: Clinical and Molecular Teratology, Volume 73, Issue 7, Pages 487 - 497, Published Online: 15 Jun 2005.
- ²⁴ Study on the pathogenic factors of Kashin-Beck disease. Peng A, Yang C, Rui H, Li H., *J Toxicol. Environ. Health*, Feb. 1992; 35(2): 79-90.
- ²⁵ Kashin-Beck: China's Crippling Ailment Disfiguring Disorder Mystifies Medical Experts. David Di Fiore *The Washington Post* Washington, D.C. Author: Date: Aug 28, 1990
- ²⁶ Mycotoxin Regulations: Implications for International Agricultural Trade Erik Dohlman, Economic Research Service, U.S. Department of Agriculture, Beltsville, MD, February, 2004
- ²⁷ History of Erythroxyllum and Notes on Diseases and Pests at Kauai Field Site by Lee Darlington, Weed Science Laboratory, Beltsville Agricultural Research Center, Beltsville, MD 20705, http://mycoherbicide.info/World-Regions/US/Hawaii/history_of_erythroxyllum_and_note.htm.
- ²⁸ Freedom of Information Act response RL 2000-0051 from Yvonne Sherman, FOIA officer at the Department of Energy to Jeremy Bigwood responding to request for “documents of any kind referring to work on *Fusarium* species and documents Battelle and DOE have researched mycoherbicides against drug plants.” Citations of responsive documents were provided as well as “a number of documents that may be responsive to your request, however, they are currently classified.”
- ²⁹ International Institute of Biological Control (An Institute of CAB International) Progress Report on USDA Weed Pathology Project (Fox 916) December 1994 – November 1995
- ³⁰ Ag/Bio Con presentation, by Dr. David Sands, Bogotá, Colombia, Jan. 2000, <http://mycoherbicide.info/World-Regions/US/AgBioCon/pages/3.htm>.
- ³¹ On June 2, 1991, the *Miami Herald* published Sharon Stevenson's article entitled: "Peru farmers blame U.S. for coca-killing fungus." This was the first article in the non-Peruvian press on the issue of *Fusarium* in Peru.
- ³² Peru Fungus a Silent Ally in War on Drugs: U.S. accused of creating blight killing coca plants and turning on other crops Eric J. Lyman, *San Francisco Chronicle*, 4 November 1999
- ³³ Oscar Cabezas, personal communication with Jeremy Bigwood and Sharon Stevenson, Tingo Maria, Peru, June 2000.
- ³⁴ “Residual mycotoxins from the epidemic,” <http://mycoherbicide.info/HEALTH/Toxicity/SOIL/SOIL.htm>.

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- ³⁶ Soil Micororganisms and Higher Plants, Academy of Sciences of the USSR Institute of Microbiology N. A. Krasil'nikov Published by the USSR Academy of Sciences, Moscow, 1958. Published for The National Science Foundation, Washington, D.C. and USDA, translated by the Israel Program for Scientific Translations, 1961.
- ³⁷ Memorandum, Subject: Coca species and Potential Pathogens from Eric Rosenquist, USDA/ARS/NPS/PPVS to Scott Harris, INL, April 23, 2001. Obtained through FOIA request 05-154 to USDA/ARS.
- ³⁸ Briefing Paper: Narcotic Crop Eradication Utilizing Biological Control in Afghanistan. Eric Rosenquist, Senior National Program Leader, NPS/PPVS, USDA to Secretary of Agriculture, May 10, 2004.
- ³⁹ The Use of Various Substrates for Large-Scale Production of *Fusarium oxysporum* f. sp. *Cannabis* inoculum. D.C. Hildebrand and A.H. McCain. *Phytopathology*, Vol. 68: 1099-1101, 1978.
- ⁴⁰ "Killing Cannabis with Mycoherbicides," John M. McPartland, John M.; West, David P. <http://www.gametec.com/hemp/mcpartland/mycoherbicides.html>.
- ⁴¹ McPartland JM. 1983. Fungal pathogens of *Cannabis sativa* in Illinois. *Phytopathology* 72:797.
- ⁴² McPartland JM. 1992. The Cannabis pathogen project: report of the second five-year plan. *Mycological Society of America Newsletter* 43(1):43.
- ⁴³ McPartland J.M., "Krankheiten und Schädlinge an *Cannabis*," pp. 37-38 in Symposium Magazin, 2nd Biorohstoff Hanf Technisch-wissenschaftliches Symposium. Nova Institut, Köln, Germany, 1997.
- ⁴⁴ McPartland JM, Cubeta MA. 1997. New species, combinations, host associations and location records of fungi associated with hemp (*Cannabis sativa*). *Mycological Research* 101:853-857.
- ⁴⁵ McCain AH, Noviello C. 1985. Biological control of *Cannabis sativa*. Proceedings, 6th International Symposium on Biological Control of Weeds, pp.635-642.
- ⁴⁶ Letter from Dr. David Sands to DEA on March 10, 1989, obtained through FOIA request.
- ⁴⁷ An immunocompromised individual is generally defined as a person who exhibits an attenuated or reduced ability to mount a normal cellular or humoral defense to challenge by infectious agents, e.g., viruses, bacterial, fungi and protozoa. Persons considered immunocompromised include malnourished patients, patients undergoing surgery and bone marrow transplants, patients undergoing chemotherapy or radiotherapy, neutropenic patients, HIV-infected patients, trauma patients, burn patients, patients with chronic or resistant infections such as those resulting from myelodysplastic syndrome, and the elderly, all of who may have weakened immune systems. <http://www.cpnhelp.org/?q=Cpndiseases>.
- ⁴⁸ Fusariosis – Amenazando la Salud. Dr. Oswaldo Jave PowerPoint Quito, October, 2000.
- ⁴⁹ Handout from Washington University in St. Louis.
- ⁵⁰ Pers. com. Eric Rosenquist, Senior National Program Leader, NPS/PPVS, U.S. Department of Agriculture, March 20, 2006.
- ⁵¹ "Drug Control or Biowarfare?" Sharon Stevenson and Jeremy Bigwood, *Mother Jones Online*, May 16, 2000.
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⁵⁹ "Nep1 Protein From *Fusarium oxysporum* Enhances Biocontrol of Opium Poppy by *Pleospora papaveracea*," B. A. Bailey, P. C. Apel-Birkhold, O. O. Akingbe, J. L. Ryan, N. R. O'Neill, and J. D. Anderson; *Phytopathology* Vol. 90, No. 8, 2000 817, accepted on 28 April, 2000.

⁶⁰ Presidential Determination No. 2000-28, William J. Clinton, The White House, Office of the Press Secretary (South Brunswick, New Jersey) August 22, 2000, For Immediate Release, August 23, 2000.

⁶¹ "Environmental authorities rule out use of *Fusarium oxysporum* fungus in Andean Community countries," Press Release by the Andean Committee of Environmental Authorities (CAAAM) stated its "rejection of the use of the '*Fusarium oxysporum*' fungus as a means of eradicating illegal crops in the Member Countries of the Andean Community," Lima, Sept. 7, 2000. <http://www.comunidadandina.org/INGLES/press/press/np8-9-00.htm>.

⁶² "Plan Afghanistan" TNI Drug Policy Briefing 10, February 2005, <http://www.tni.org/policybriefings/brief10.htm>.

⁶³ Unclassified Memorandum from Eric Rosenquist, Senior National Program Leader, NPS/CPPVS, U.S. Department of Agriculture, ARS to John H. Barger, Deputy Director, Office of Policy and Planning, Department of State, INL and Scott Harris, United Nations Program Officer, Department of State, INL, undated- written after a January 29, 2004 meeting. Obtained through FOIA request 05-154 to USDA/ARS.

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⁶⁵ Risks of Using Biological Agents to Eradicate Drug Plants, Sunshine Project, Backgrounder #14, September 2005.

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⁷² Ibid.

⁷³ Ibid.

⁷⁴ "Fungus Considered As A Tool To Kill Coca In Colombia," Tim Golden, *The New York Times*, July 6, 2000.

⁷⁵ Briefing Paper: Narcotic Crop Eradication Utilizing Biological Control in Afghanistan. Eric Rosenquist, Senior National Program Leader, NPS/CPPVS, USDA to Secretary of Agriculture, May 10, 2004.