# 1n

## 1

#### Interpretation: Reduce means to lower in amount or make smaller.

Cambridge English Dictionary

“Meaning of reduce in English” Cambridge English Dictionary [https://dictionary.cambridge.org/us/dictionary/english/reduce //](https://dictionary.cambridge.org/us/dictionary/english/reduce%20//) Phoenix

reduce

to [become](https://dictionary.cambridge.org/us/dictionary/english/become) or to make something [become](https://dictionary.cambridge.org/us/dictionary/english/become) [smaller](https://dictionary.cambridge.org/us/dictionary/english/small) in [size](https://dictionary.cambridge.org/us/dictionary/english/size), [amount](https://dictionary.cambridge.org/us/dictionary/english/amount), [degree](https://dictionary.cambridge.org/us/dictionary/english/degree), [importance](https://dictionary.cambridge.org/us/dictionary/english/importance), etc.:

#### In legal context – it still means lower in amount

FindLaw Legal Dictionary

FindLaw Legal Dictionary [FINDLAW](https://www.findlaw.com/)/[FINDLAW LEGAL DICTIONARY](file:///C:\Users\Armaan\Dropbox\ArmaanDrills\Tournaments\Plano%20West%20Classic\Octas\FINDLAW%20LEGAL%20DICTIONARY)/ [R](file:///C:\Users\Armaan\Dropbox\ArmaanDrills\Tournaments\Plano%20West%20Classic\Octas\R)/ REDUCE https://dictionary.findlaw.com/definition/reduce.html // Phoenix – Brackets in original article

Reduce

reduce vt

re·duced  
re·duc·ing  
1 : to make smaller  
2 a : to convert (a chose in action) into a chose in possession [enforcement action sought to to possession her property interest in the…determination of money damages "Haynes v. Contat, 643 N.E.2d 941 (1994)"]  
b : to convert by enforcement through litigation [may his claim to judgment, foreclose or otherwise enforce the security interest "Uniform Commercial Code"]

#### International legal code uses ‘Reduce’ in context of lower in degree or amount – warming remedies prove

Hunter ’21

Hunter, David. “International Environmental Law.” Americanbar.org, January 05, 2021 https://www.americanbar.org/groups/public\_education/publications/insights-on-law-and-society/volume-19/insights-vol--19---issue-1/international-environmental-law/. // Phoenix

At least since the 1980s, scientists have warned that increasing concentrations of carbon dioxide and other greenhouse gases would warm the earth's atmosphere and change our climate. Today, climate change is the most serious environmental challenge of our time, and we are already seeing its impacts: increased global temperatures; melting glaciers; reduced Arctic sea ice; increased tidal and storm surges; and increased heat waves and droughts.  
Avoiding the most dangerous impacts from climate change has been a major focus of international environment law since the 1992 United Nations Framework Convention on Climate Change (the UNFCCC), which recognized climate change as "a common concern of humankind" and set out a framework for global action to avoid harmful impacts. The Convention set an informal goal to reduce emission levels of greenhouse gases to 1990 levels by the year 2000, but it did not impose any binding targets or timetables on any country.  
Thirty- eight industrialized countries subsequently agreed in the 1997 Kyoto Protocol to reduce their overall emissions to approximately 5 percent below 1990 levels by the year 2012. Having agreed to cap emissions, the countries also established elaborate procedures for trading the rights to pollute under the cap. The Kyoto Protocol's "cap-and-trade" approach thus envisioned a global market for reducing carbon dioxide and other greenhouse oases. The United States first signed the Protocol in 1998 but rejected it three years later after President Bush took office. The Kyoto Protocol would catalyze Europe’s reduction in GHG emissions and create a market for GHG emission credits--but the departure of the United States from the Protocol and the need to include China and other major emitting countries would lead to a search for a different approach.  That approach would (finally) come in the form of the 2015 Paris Agreement on Climate Change.

#### Violation: They [DO SOMETHING THAT IS NOT A REDUCTION]

#### [READ IF THE AFF IS A DELAY]

#### Delay is not a reduction

Meriamm Webster No Date

[https://www.merriam-webster.com/dictionary/delay //](https://www.merriam-webster.com/dictionary/delay%20//) Phoenix

Definition of delay

 (Entry 1 of 3)

1a: the act of postponing, hindering, or causing something to occur more slowly than normal : the state of being [delayed](https://www.merriam-webster.com/dictionary/delay#h2) get started without delay

b: an instance of being delayed apologized for the delaya rain delay

2: the time during which something is delayed waited out a delay of 30 minutes

delay

[verb](https://www.merriam-webster.com/dictionary/verb)

delayed; delaying; delays

#### Delays do not stop or prevent an action – Traffic may delay you but it does not stop you from getting to your destination

Cambridge English Dictionary No Date

[https://dictionary.cambridge.org/us/dictionary/english/delay //](https://dictionary.cambridge.org/us/dictionary/english/delay%20//) Phoenix

delay

verb

to make something [happen](https://dictionary.cambridge.org/us/dictionary/english/happen) at a [later](https://dictionary.cambridge.org/us/dictionary/english/later) [time](https://dictionary.cambridge.org/us/dictionary/english/time) than [originally](https://dictionary.cambridge.org/us/dictionary/english/originally) [planned](https://dictionary.cambridge.org/us/dictionary/english/planned) or [expected](https://dictionary.cambridge.org/us/dictionary/english/expected):

My [plane](https://dictionary.cambridge.org/us/dictionary/english/plane) was delayed by an [hour](https://dictionary.cambridge.org/us/dictionary/english/hour).

Heavy [snow](https://dictionary.cambridge.org/us/dictionary/english/snow) delayed the [start](https://dictionary.cambridge.org/us/dictionary/english/start) of the [game](https://dictionary.cambridge.org/us/dictionary/english/game).

[[-ing verb ]](https://dictionary.cambridge.org/us/help/codes.html) I [think](https://dictionary.cambridge.org/us/dictionary/english/think) we should delay deciding about this until next [year](https://dictionary.cambridge.org/us/dictionary/english/year).

to [cause](https://dictionary.cambridge.org/us/dictionary/english/cause) someone or something to be [slow](https://dictionary.cambridge.org/us/dictionary/english/slow) or late:

I was delayed by [traffic](https://dictionary.cambridge.org/us/dictionary/english/traffic).

#### Limits – Anything else explodes the caselist since the aff could delay IPP to any arbitrary end or change IPP in any possible way – there is no boundary to restrict them in how they change IPP. Only reduce grants the neg some predictable stasis for prep by researching about why IPP is good and so why a world without IPP is bad. Limits outweighs on depth – anything else means the neg reads generics like the Kant NC or a Security K without ever engaging the aff.

#### Ground – All negative ground is based on IP good. The Innovation DA, Heg DA, Politics DA, Counterfeits turn, Pharmaceutical Backlash turn, Bioterror turn, etc all link to a removal of IP protections. A lack of modification guts neg ground since none of our offense would link to the aff. Ground outweighs on necessity – we can’t have a debate if one side does not have arguments to read.

#### Paradigm Issues

#### 1 – Drop the debater – their abusive advocacy skewed the debate from the start and we can’t come back

#### 2 - Comes before 1AR theory — A - If we had to be abusive it’s because it was impossible to engage their aff, B – Neg abuse outweighs aff abuse because we control the depth of the debate if we can’t engage depth is impossible

#### 3 - Use competing interps on T – A – T is a yes/no question, you can’t be half topical or mostly topical B - reasonability invites arbitrary judge intervention and a race to the bottom of questionable argumentation

#### 4 - No RVIs – A - Forcing the 1NC to go all in on the shell kills substance education and neg strat, B - discourages checking real abuse C - Encourages baiting – outweighs because if the shell is frivolous, they can beat it quick

## 2

#### Interpretation: Debaters may not specify which intellectual property or group of properties they reduce in the 1AC.

#### There were over 100,000 medical patents in 2018

WIPO ‘20

WIPO (2020). World Intellectual Property Indicators 2020. Geneva: World Intellectual Property Organization <https://www.wipo.int/edocs/pubdocs/en/wipo_pub_941_2020.pdf> // Phoenix – brackets for clarity

In 2018 – the latest year for which complete data are available due to the delay between application and publication – computer technology was the most frequently featured technology in published patent applications worldwide, with 234,667 published applications (table A29). It was followed by electrical machinery (215,828), measurement (164,255), [for] medical technology [were] (147,542) and digital communication (146,416). Together, these five fields accounted for 28.4% of all published applications globally.

#### Violation: they did

#### Standards:

#### 1] Limits – *It would literally make a case list of over 100,000* which is obviously impossible to prep for even if we had a giant coaching squad who can cut 10 case negs a day *it wouldn’t even be 1% of the case list.*

#### a) Limits outweighs – it controls the balance of prep which controls the rest of the debate since one debater could be worse than another but win on brute force of more and better cards.

#### 2] Ground – We lose all of our offense that links into general property rights or certain types of patents i.e if we read a DA to vaccines and you read a N95 aff we wouldn’t link. It also means even if we did link it would be tiny and the 1AR would always be ahead since they could leverage the specificity of the aff.

#### 3] Topic Education – Authors do not write about specific patents since there is way too many – definitely not 100,000 authors writing about Intellectual property rights – and even if there were that would mean one author per every aff creating a tiny and narrow debate.

#### a) Topic education outweighs on Timeframe since we only get 2 months to debate about the topic

#### Cross apply paradigm issues from the first shell

## Case

### WMD Defense

#### Lack of expertise, knowledge, infrastructure prove no bioterror – but even if it happens safeguards check

Seitz 16 (Sam, Director of Nuclear Security Studies @ the Global Intelligence Trust, “Why WMD Terrorism Isn’t as Scary as it Seems” https://politicstheorypractice.wordpress.com/2016/08/26/why-wmd-terrorism-isnt-as-scary-as-it-seems/)

Biological attacks are equally unlikely to occur for many of the same reasons. There simply aren’t many biological weapons programs because the use of these kinds of systems is prohibited by international law. Thus, few individuals have the requisite knowledge to engineer and produce effective bio-agents. Without proper expertise and infrastructure, it is unlikely that terrorist networks will ever possess the knowledge or means to produce weapons grade biological agents (7). Like chemical weapons, biological weapons also have a poor track record when it comes to inflicting serious damage. As Alan Dove explains, “Terrorist groups have… deployed biological weapons twice… The first was [in] 1984… [when] a cult in Oregon inoculated restaurant salad bars with Salmonella… 751 people got sick, but nobody died.” The second biological terrorist attack was conducted by another cult, the same one that launched the chemical attack in Tokyo; its bio-attack was even less effective than its chemical attack. Despite the cult being “well-financed, and [having] many highly educated members… Nobody got sick or died” (8). Finally, it’s important to remember that the United States and other Western countries have impressively modern and well-funded public health institutions. Thus, even if terrorists are able to execute a potent biological attack against metropolitan areas in North America or Europe, it is unlikely that casualties would be high, as well-stocked hospitals and emergency response units would be able to mitigate the impact and prevent worst case scenarios.

#### No risk of bioterror – even weaponized pathogens can’t be dispersed

Kolssak 15

12 October 2015 Spencer Kolssak writes about domestic and international terror threats for the Patrick Henry Inteligencer. The Intelligencer‘s mission is to expand public understanding of crucial matters in national security, intelligence, and international relations. The Intelligencer is a student-led special project sponsored by Patrick Henry College’s Strategic Intelligence (SI) program. http://phcintelligencer.com/2015/10/12/bioterrorism-neither-likely-nor-practical/

Past Bioterrorism Attempts The record of attempted use of biological weapons is very limited. Most nations ended their offensive biological weapons programs with the ratification of the Biological Weapons Convention in 1972. The United States ceased its programs in 1970, but continued biological weapons research for defensive purposes. In April 1979, 68 people died in Sverdlovsk, Russia, as a result of an anthrax leak from a Soviet bioweapons facility. In 1995, the Iraqi government admitted that it had a program to research and produce weaponized anthrax.7 The anthrax attacks of 2001, dubbed “Amerithrax”, are the most famous example of a biological weapons attack.1 Letters sent through the mail laden with dried anthrax spores killed five people and sickened seventeen.1 The genetic strain used in the attack was specially engineered, demonstrating that the perpetrator had access to US bioweapons research facilities.7 The investigation eventually centered on Bruce Ivans, a US scientist. Ivans took his own life before federal investigators could bring formal charges.8 Perhaps even more relevant are the failed bioterror attacks by the Japanese cultist group, Aum Sinrikyo. In the late 1980s, Aum spent millions of dollars and employed a team of trained scientists to engineer advanced biological agents. They experimented with botulinum toxin, anthrax, cholera, and even Q fever in hopes of producing enough biological agent to trigger a global Armageddon.9 Aum had access to **far more scientific resources** than any modern Islamist terror group. In April 1990, the group used a fleet of trucks equipped with aerosol sprayers to disperse liquid botulinum on the Imperial Palace, the National Diet of Japan, the US Embassy in Tokyo, and two US naval bases in Narita. No casualties resulted; no one outside the cult even knew that the terrorist attacks had taken place.9 Three years later, in June and August of 1993, Aum decided to switch to anthrax as its biological agent. This time, in addition to its fleet of trucks, the group used aerosol sprayers mounted on its headquarters building to create a cloud of anthrax over Tokyo. Again, the attacks were unsuccessful and went unnoticed. It was only after a successful 1995 subway attack using Sarin nerve gas (a chemical agent) that investigations discovered the 1990 and 1993 attacks.9 Hollywood Has it Wrong The historical record demonstrates that weaponized biological agents have been used infrequently and ineffectually. Terrorists want to spread destruction by any means they can. **If bioterrorism really was effective, more terrorist groups likely would have used pathogens as weapons by now**. The absence of widespread bioterrorism helps to show the gap between current misconceptions and reality. One gram of anthrax contained within one of the letters in 2001 had enough spores to kill thousands of people. Combined, the amount of anthrax used in the attacks could have killed millions.10 Yet the attacks only killed five. Even though the anthrax terrorist had enough biological agent to kill millions, he did not have the capability to distribute his weapon effectively. As the Aum Shinrikyo biological attacks demonstrated, even a sophisticated group of scientists working to incite global Armageddon can find it difficult to actually execute biological attacks. Terrorists have to overcome a number of challenges in order to effectively convert biological agents into weapons of mass destruction. The use of a pathogen as a biological agent depends on the group’s ability to isolate a virulent strain, weaponize it, and then distribute it. If the group could successfully isolate a dangerous genetic strain, it would then turn to two possible methods of distribution: aerosolized spray and human carriers.11 Most non-state actors do not possess the technology necessary to refine the aerosol method. Wind patterns and humidity can render such an attack ineffective. The human carrier method is less expensive but also has a number of problems. It requires the pathogen to be a contagion. Once the carrier is infected, he must be mobile while contagious and cannot be visibly ill—a situation that is unlikely with serious diseases like Ebola.11 All other possible means of delivering a biological agent are fraught with even more problems. Each potential biological agent also has individual reasons why it would not make an effective weapon of terror. Ebola is only transmitted through direct contact with the bodily fluids of someone infected with the disease.12 Anthrax is not easily transmitted across individuals and is unlikely to spark an epidemic. Anthrax can also be treated by readily available antibiotics if noticed in time.9 Even incredibly deadly biological agents like ricin and botulinum are hard to use in mass attacks due to the difficulty in converting them into a weaponized form that can be readily dispersed.

### Monopolies Defense

#### 1] Big Pharma patent monopolies have failed – their Thailand example proves – the patents were indefinitely banned.

Reuters 19 Staff. “Thailand to Revoke Foreign Patent Requests on Marijuana.” Reuters, Thomson Reuters, 28 Jan. 2019, www.reuters.com/article/us-thailand-cannabis/thailand-to-revoke-foreign-patent-requests-on-marijuana-idUSKCN1PM1FU. //sid

Thailand on Monday effectively revoked all foreign patent requests for the use of marijuana, after fears foreign firms would dominate a market thrown open last month when the government approved the drug for medical use and research. The junta-appointed parliament in Thailand, a country which until the 1930s had a tradition of using marijuana to relieve pain and fatigue, voted to amend the Narcotic Act of 1979 in December in what it described as “a New Year’s gift to the Thai people”. While countries from Colombia to Canada have legalized marijuana for medical or even recreational use, the drug remains illegal and taboo across much of Southeast Asia. But in Thailand, the main controversy with the legalization involved patent requests by two foreign firms, British giant GW Pharmaceuticals and Japan’s Otsuka Pharmaceutical, filed before the change to the law. Thai civil society groups and researchers feared domination by foreign firms could make it harder for Thai patients to get access to medicines and for Thai researchers to get marijuana extracts. ADVERTISEMENT The military government issued a special executive order on Monday enabling the Department of Intellectual Property to revoke all pending patents that involve cannabis, or remove marijuana from those patents, within 90 days. “The pending patent requests are illegal,” Somchai Sawangkarn, a member of parliament responsible for amending the Narcotic Act told Reuters. “This NCPO order is beneficial for Thai people across the country because it prevents a monopolistic contract,” he said referring to the junta by its official name, the National Council for Peace and Order. Reuters did not have contact details for spokesmen for either of the two foreign firms and the companies did not immediately respond to emailed requests for comment.

#### 2] Barnett has no internal to innovation in medical marijuana – it’s specific to farmers not being able to grow weed to sell, not medical research.

#### 3] No impact to marijuana innovation – we don’t need new types of weed. This doesn’t turn our innovation arguments because our link is that reduction in IP chills innovation for all medicine due to fear of spillover

#### 4] No Uniqueness – Biden wont’ legalize Marijuana at a federal level.

Kane 21 Kris Kane 3-26-2021 "Enjoy Marijuana? Joe Biden Doesn’t Care About You" <https://www.forbes.com/sites/kriskrane/2021/03/26/enjoy-marijuana-joe-biden-doesnt-care-about-you/?sh=4dec240e651d> (Senior Contributor at Forbes on the Weed Industry)//Elmer

This pattern of legalization supporters backpedaling to appease Joe Biden dates back to the campaign itself, where **Biden’s** **campaign** seemingly **sought to roll back years of progress** made by the Democratic Party since President Obama left office. In 2016 the Democratic Party platform included language calling for a “pathway” to legalization. Yet in 2020 **Biden’s campaign rejected** such language, removing any mentions of **meaningful cannabis policy reform** from the platform. When supporters tried to add a legalization plank back into the platform, even co-chair of the Congressional Cannabis Caucus Rep. Barbara Lee (D-CA) voted against it, presumably not to run afoul of the wishes of her party’s standard bearer despite her own strong support for legalization. Of course, none of this should be especially surprising. Joe **Biden’s record on marijuana**, drugs and crime **is** arguably **the worst** and most punitive of any Democratic politician of the past 50 years not named Diane Feinstein. He was an author and **champion** of the 1994 Crime Bill that is largely responsible **for** the current **mass incarceration** crisis in this country, and was the lead sponsor of the RAVE Act, one of the last pieces of draconian drug policy legislation passed by Congress that punished concert venue owners and promoters if drugs were used or sold at their events, even if they had no knowledge or involvement in the drug related activity. This is a politician who in 1974 said, “I don’t think marijuana should be legalized,” repeating that sentiment **as recently as 2010** when he **stated** “**I think legalization is a mistake**.” As Vice President in 2012 Biden had ““serious doubts that decriminalization would have a major impact on the earnings of violent criminal organizations,” and that “on examination you realize there are more problems with legalization than with non-legalization.”

### Biod Impact Turn

#### Cannabis ag fragments forests and kills mammal biodiversity

Shoemaker 17

[Stephen Shoemaker, Ithaca College, WRITER AND CONTENT SPECIALIST, PUBLIC RELATIONS, CREATIVE AND MARKETING GROUP) Co Authored by Jake Brenner, Associate Prof. of Environmental Studies and Sciences at Ithaca) “Ithaca College Professor Finds Cannabis Cultivation Hurts Environment” IC News, Oct 31 2017] RM

Planting cannabis for commercial production in remote locations is creating forest fragmentation, stream modification, soil erosion and landslides. Without land-use policies to limit its environmental footprint, the impacts of cannabis farming could get worse, according to a new study published in the November issue of Frontiers in Ecology and the Environment.

Earlier studies have shown that cannabis production causes environmental damage, including rodenticide poisoning of forest mammals and dewatering of streams due to improper irrigation.

Cannabis, as either a medicinal or recreational drug, is now legal in more than 30 U.S. states and in several countries. In California, where medicinal marijuana has been legal since 1996, voters in November approved the sale and possession of one ounce of marijuana for recreational use. As a result, cannabis production is ramping up.

"Cannabis leaves a small spatial footprint but has potentially significant environmental impacts," said co-author Jake Brenner, associateprofessor in the Department of Environmental Studies and Sciences at Ithaca College. "To mitigate these impacts, policymakers and planners need to enact specific environmental and land-use regulations to control cannabis crop expansion during this early stage in its development."

Scale matters Effective policymaking for a new crop can be challenging without scientific data. In this study, Brenner, along with Van Butsic, a University of California Cooperative Extension specialist in UC Agriculture and Natural Resources and the UC Berkeley Department of Environmental Science, Policy and Management, and Ian J. Wang, assistant professor in the UC Berkeley Department of Environmental Science, Policy and Management, present an approach for early assessment of landscape changes resulting from new agricultural activities.

Their approach uses per-unit-area analysis of landscape change. To study forest fragmentation in northern California, the scientists compared the effects of cannabis cultivation to those of timber harvest from 2000 to 2013 in Humboldt County.

Based on the size, shape and placement of the cannabis grows among 62 randomly selected watersheds, they quantified the impacts relative to those of timber harvest.

"We found that although timber has greater landscape impacts overall, cannabis causes far greater changes in key metrics on a per-unit-area basis," said Butsic.

On a per-unit-area basis, the cannabis grows resulted in 1.5 times more forest loss and 2.5 times greater fragmentation of the landscape, breaking up large, contiguous forest into smaller patches and reducing wildlife habitat.

"The results show how important it is to consider environmental impacts at different scales," said Brenner.

Current California law caps the size of outdoor cannabis production to 1 acre per parcel, to prohibit the development of industrial-scale cannabis operations outdoors. An unintended consequence of this law may be small dispersed cannabis grows that edge out wildlife.

While the long-term effects of cannabis cultivation on the environment are unknown, the researchers concluded that land management and agricultural policy informed by further research may reduce these threats in California and in other states and countries where cannabis production can be regulated.

"Studies like this one have the potential to directly inform local land-use policy and state environmental regulation," said Brenner. "It's exciting to be a part of this research because it is capturing a human-environment phenomenon at the moment of its emergence."

#### Continued biodiversity loss causes extinction

Corbett 2/19 [(Jessica, a staff writer for Common Dreams) Internally cites IPBES (the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, an intergovernmental organization established to improve the interface between science and policy on issues of biodiversity and ecosystem services.) “World Leaders Urged to 'Act Now' to Save Biodiversity” EcoWatch, 2/19/2020] BC

Ahead of government negotiations scheduled for next week on a global plan to address the biodiversity crisis, 23 former foreign ministers from various countries released a statement on Tuesday urging world leaders to act "boldly" to protect nature.

"It is clear to us... that climate change, ecosystem degradation, and the excessive exploitation of natural resources are now threatening millions of species with extinction and jeopardizing the health of our planet," says the statement. "The loss and degradation of nature jeopardizes human health, livelihoods, safety, and prosperity. It disproportionately harms our poorest communities while undermining our ability to meet a broad range of targets set by the United Nations Sustainable Development Goals."

"The world has a moral imperative to collaborate on strong actions to mitigate and adapt to the current climate change and biodiversity crisis. Ambitious targets for conservation of land and ocean ecosystems are vital components of the solution," the statement continues. "Humanity sits on the precipice of irreversible loss of biodiversity and a climate crisis that imperils the future for our grandchildren and generations to come. The world must act boldly, and it must act now."

A U.N. report released in May 2019 by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) warned that, as Common Dreams reported at the time, "human exploitation of the natural world has pushed a million plant and animal species to the brink of extinction—with potentially devastating implications for the future of civilization."

That report and a growing body of scientific research on rapidly declining biodiversity has led scientists and policymakers alike to raise the alarm about the consequences of not acting ambitiously enough to address what experts have called the "sixth mass extinction." U.N. biodiversity chief Elizabeth Maruma Mrema told the Guardian last month that humanity risks being left to contend with an "empty world."

The new statement from diplomats came before the Feb. 24–29 meeting of the Working Group on the Post-2020 Global Biodiversity Framework, which was recently moved from Kunming, China to Rome, Italy due to the ongoing coronavirus disease (COVID-19) outbreak. The event will build on an August 2019 meeting in Nairobi, Kenya. A third meeting in Cali, Colombia is planned for July.

### Ag Impact Turn

#### Cannabis causes ag loss from plant diseases

Geaseeds 20 [Geaseeds, cannabis seeds. November, 2020. “MARIJUANA DISEASES | CANNABIS” <https://geaseeds.com/blog/en/marijuana-diseases-cannabis/> Accessed 9/5 //gord0]

The intention of this article is to offer all kinds of **information related to the diseases that affect the correct development of cannabis** (as well as its causes and consequences). As every expert grower knows, diseases are many and fighting them takes a lot of time, dedication and effort. Below, we will summarize a wide and varied amount of information related to the types of diseases, the factors that favor their appearance and expansion, as well as the symptoms that provoke and help us to recognize them. Introduction Generally, losses in agricultural production are attributed **to insect and parasite** [pests](https://geaseeds.com/blog/en/cannabis-pests-marijuana/) **that attack crops.** This is logical, as it usually is, but there is another factor that causes numerous losses in agriculture and yet it is not as well-known as the previous one; we are referring to what are known as plant diseases. These types of diseases **cause irreparable damage to crops**, causing significant annual losses in agriculture. The following is a brief and concise summary of the various diseases that can affect our [cannabis cultivation.](https://geaseeds.com/blog/en/manual-of-cultivation/) What is a plant disease? Plant diseases are infectious agents and abiotic disorders that attack plants and negatively influence the development of their vital functions. This occurs when pathogenic microorganisms or environmental factors determine adverse changes in plant form, integrity or function, negatively affecting plant tissues and cells. The result is partial inability to perform their vital functions, and even death at worst. How are marijuana diseases classified? In terms of classification, it should be noted that they are divided into two main groups, parasitic and non-parasitic. The former are those caused by microscopic **organisms such as** [fungi](https://geaseeds.com/blog/en/types-of-fungi-in-cannabis-prevention-remedies-and-treatments/)**, viruses, bacteria and nematodes, among others.** On the other hand, non-parasitic diseases are those whose causative agents are not contagious and can be very varied. For example, non-parasitic diseases can be caused by adverse climatic conditions, as well as by excess or lack of irrigation, over-fertilization and, in general, poor agricultural practices. **It is estimated that approximately 10% of losses in the agricultural industry** worldwide are caused by plant diseases. Therefore, this type of infectious agents and abiotic disorders are the cause of very important losses in agriculture. This gives us an idea of the importance of this type of disease, which, like the agricultural industry, also leads to numerous losses in cannabis cultivation. Although being a very resistant plant species, marijuana is also affected by these diseases. In fact, it is estimated that there are approximately 100 plant diseases that directly affect the correct development of the vital functions of cannabis. This is the reason why we have decided to dedicate an entire article to the resolution of all types of doubts, providing the customer with the necessary information to know and prevent this problem. Which parts of the plant are affected and how do they affect them? **Plant diseases** do not attack plants in the same way. In fact, depending on the disease in question, the tissues and cells affected will be different and, therefore, the type of physiological function that will be affected will also be different. Below, we explain what parts of the plant affect infections and what functions they affect. Firstly, to highlight the root infections, which can cause rotting of the same. If this happens, the plant will be unable to absorb the nutrients and water necessary for its proper development. Secondly, diseases can also affect xylem vessels. For those less placed in the matter, it should be noted that xylem is the plant tissue formed by cells that carry the sap to the leaves. When xylem is affected by disease, the translocation of water and nutrients within the plant is negatively affected and vascular and fungal shriveling begins to appear. Another part of the plant that is usually affected by plant diseases is the leaves. These infections directly interfere with the plant’s photosynthesis process and manifest themselves in the form of stains, rust, blight, mildew and mosaics. Finally, it is worth mentioning the infections of flowers and fruits, which will directly interfere with the reproduction of the plant. Most plant diseases cause infected plant cells to weaken or die. However, there are also other diseases in which infected cells are induced to divide more rapidly (hyperplasia) or to enlarge (hypertrophy) and thereby produce abnormal and amorphous tissues (tumors) or abnormal organs.

#### Ag key to food security

Miller 17 [Jim Miller, Under Secretary for Farm and Foreign Agricultural Services. Feb 21, 2017. “Agriculture Key to Food Security” [https://www.usda.gov/media/blog/2010/08/05/agriculture-key-food-security Accessed 9/5](https://www.usda.gov/media/blog/2010/08/05/agriculture-key-food-security%20Accessed%209/5) //gord0]

During this year’s International Food Aid and Development Conference (IFADC), food security featured prominently as both a major concern and a primary program focus for current and future USDA projects. Each year the IFADC brings together USDA, the U.S. Agency for International Development, private sector companies and voluntary organizations who collaborate throughout the year to provide America’s food aid and assistance to the world’s neediest people. This week I joined USDA and USAID leaders in Kansas City to address this important subject.

You may not be aware, but the United States is the largest provider of food assistance in the world. Over the past 10 years, we have supplied about one-half of total international food assistance, and in 2009 alone United States programs reached over 70 million people worldwide.

Even with America’s food aid experience and resources, the number of poor, hungry people continues to grow.  In 2008, a supply and demand imbalance in global food systems raised international food prices and resulted in increased instability in food insecure countries. This served as a wake-up call to rich and poor countries alike that we need to begin reinvesting in our agricultural sectors.

Last year, the G8 leaders committed to combating food insecurity, a priority echoed by the Obama Administration’s pledge to invest $3.5 billion in the next three years and the whole-of-government [Feed the Future (FTF)](http://www.feedthefuture.gov/) initiative. Agriculture plays an important role in this new approach. The majority of people in developing countries depend on it not only for food, but also as a main source of income and employment.

Public-private partnerships provide farmers technical assistance to form cooperatives, improve production, or storage and handling, and these practices and information can be passed on to future generations and larger groups. Through sustainable food programs that continue years after U.S. funding has ended, such as [USDA’s McGovern-Dole Food for Education Program](http://www.fas.usda.gov/excredits/foodaid/ffe/FFE.asp), the U.S. will increasingly seek new ways of using private money, businesses and trade to help struggling countries become self-sufficient in feeding their people.

With the number of chronically hungry people now surpassing one billion, we need a sustainable approach to answer the call of those in need, sharing America’s bounty and knowledge with those less fortunate. USDA sees its engagement in Feed the Future as central to achieving that goal. Our unique capacities in research, extension, and institutional capacity building can make an important contribution to long term food security.

### Inevitable – Alt Causes

#### 1. Acidification.

CBD, 10 (Center for Biological Diversity, Targeted News Service, “Legal Settlement Will Require EPA to Evaluate How to Regulate Ocean Acidification Under Clean Water Act”, 2010, L/N)

Ocean acidification, the "other carbon dioxide problem," results from the ocean's absorption of CO2 from the atmosphere, which increases the acidity of the ocean and changes the chemistry of seawater. The primary known consequence of ocean acidification is that it impairs the ability of marine animals to build and maintain the protective shells and skeletons they need to survive. Nearly every marine animal studied to date has experienced adverse effects due to acidification. "Ocean acidification is global warming's evil twin, and **CO2 pollution is one of the biggest threats to our marine environment**," said Sakashita. "We need prompt action to curb CO2 emissions to avoid the worst consequences of acidification."

#### 2. Overfishing.

NEWS Press ‘9(“End of the line at famed film festival”, 1-19, L/N)

Audiences at the famous Sundance film festival are being treated to the world premiere of a new movie highlighting the parlous state of the world's oceans. The End of the Line, a feature length documentary made with the support of WWF, has its first showing in the World Cinema Documentary competition today (Monday 19th Jan). The film - based on the book of the same name by UK environment journalist Charles Clover - calls for networks of marine protected areas, well-managed fishing and sustainable seafood as key solutions to restoring our oceans' health and bounty. Along with several other NGOs, WWF contributed to the film both financially and with expert advice. The End of the Line points the finger at over-fishing as one of the main reasons behind the current state of our marine environment. WWF International's Director of Marine Programme, Miguel Jorge, agrees. "**Overfishing is the single biggest immediate threat to our oceans**, and the film highlights some of the most conspicuous examples of excessive exploitation of marine resources, such as the decimation of bluefin tuna stocks in the Mediterranean." "It is important to note that there are many within the fishing and seafood sectors working hard to fish responsibly and supply consumers with healthy seafood that is good for the oceans and WWF is committed to working openly with these proactive, progressive players."

#### 3. Plastic pollution.

NYT, 8(Donovan Hohn, Contributing Ed. – Harpers, “Sea of Trash”, 6-22, L/N)

We still have limited tax dollars to spend and scarier nightmares to fear. No one -- not Pallister, not Moore -- will tell you that **plastic pollution is the greatest man-made threat our oceans face**. Depending whom you ask, that honor goes to global warming, agricultural runoff or overfishing. But unlike many pollutants, plastic has no natural source and therefore there is no doubt that we are to blame. Because we can see it, plastic is a powerful bellwether of our impact upon the earth. Where plastics travel, invisible pollutants -- pesticides and fertilizers from lawns and farms, petrochemicals from roads, sewage tainted with pharmaceuticals -- often follow. Last June, shortly before my voyage in the Opus began, Sylvia Earle, formerly N.O.A.A.'s chief scientist, delivered an impassioned speech on marine debris at the World Bank in Washington. ''Trash is clogging the arteries of the planet,'' Earle said. ''We're beginning to wake up to the fact that the planet is not infinitely resilient.'' For ages humanity saw in the ocean a sublime grandeur suggestive of eternity. No longer. Surveying the debris on remote beaches like Gore Point, we see that the ocean is more finite than we'd thought. Now it is the sublime grandeur of our civilization but also of our waste that inspires awe.

### Bioweapons

#### No impact to bioweapon---multiple barriers.

Mueller 10—Chair of National Security Studies at the Mershon Center for International Security Studies and a Professor of Political Science at Ohio State University [John, *Atomic Obsession – Nuclear Alarmism from Hiroshima to Al-Qaeda*, Oxford University Press, Emory Libraries]

Properly developed and deployed, biological weapons could potentially, if thus far only in theory, kill hundreds of thousands, perhaps even millions, of people. The discussion remains theoretical because biological weapons have scarcely ever been used. For the most destructive results, they need to be dispersed in very low-altitude aerosol clouds. Since aerosols do not appreciably settle, pathogens like anthrax (which is not easy to spread or catch and is not contagious) would probably have to be sprayed near nose level. Moreover, 90 percent of the microorganisms are likely to die during the process of aerosolization, while their effectiveness could be reduced still further by sunlight, smog, humidity, and temperature changes. Explosive methods of dispersion may destroy the organisms, and, except for anthrax spores, long-term storage of lethal organisms in bombs or warheads is difficult: even if refrigerated, most of the organisms have a limited lifetime. Such weapons can take days or weeks to have full effect, during which time they can be countered with medical and civil defense measures. In the summary judgment of two careful analysts, delivering microbes and toxins over a wide area in the form most suitable for inflicting mass casualties-as an aerosol that could be inhaled-requires a delivery system of enormous sophistication, and even then effective dispersal could easily be disrupted by unfavorable environmental and meteorological conditions.

#### The worst case scenario happened – no extinction

**Dove, Microbiology PhD, 2012**

(Alan, “Who’s Afraid of the Big, Bad Bioterrorist?”, 1-24, <http://alandove.com/content/2012/01/whos-afraid-of-the-big-bad-bioterrorist/>, ldg)

The second problem is much more serious. Eliminating the toxins, we’re left with a list of infectious bacteria and viruses. With a single exception, these organisms are probably near-useless as weapons, and history proves it. There have been at least three well-documented military-style deployments of infectious agents from the list, plus one deployment of an agent that’s not on the list. I’m focusing entirely on the modern era, by the way. There are historical reports of armies catapulting plague-ridden corpses over city walls and conquistadors trying to inoculate blankets with Variola (smallpox), but it’s not clear those “attacks” were effective. Those diseases tended to spread like, well, plagues, so there’s no telling whether the targets really caught the diseases from the bodies and blankets, or simply picked them up through casual contact with their enemies. Of the four modern biowarfare incidents, two have been fatal. The first was the 1979 Sverdlovsk anthrax incident, which killed an estimated 100 people. In that case, a Soviet-built biological weapons lab accidentally released a large plume of weaponized Bacillus anthracis (anthrax) over a major city. Soviet authorities tried to blame the resulting fatalities on “bad meat,” but in the 1990s Western investigators were finally able to piece together the real story. The second fatal incident also involved anthrax from a government-run lab: the 2001 “Amerithrax” attacks. That time, a rogue employee (or perhaps employees) of the government’s main bioweapons lab sent weaponized, powdered anthrax through the US postal service. Five people died. That gives us a grand total of around 105 deaths, entirely from agents that were grown and weaponized in officially-sanctioned and funded bioweapons research labs. Remember that. Terrorist groups have also deployed biological weapons twice, and these cases are very instructive. The first was the 1984 Rajneeshee bioterror attack, in which members of a cult in Oregon inoculated restaurant salad bars with Salmonella bacteria (an agent that’s not on the “select” list). 751 people got sick, but nobody died. Public health authorities handled it as a conventional foodborne Salmonella outbreak, identified the sources and contained them. Nobody even would have known it was a deliberate attack if a member of the cult hadn’t come forward afterward with a confession. Lesson: our existing public health infrastructure was entirely adequate to respond to a major bioterrorist attack. The second genuine bioterrorist attack took place in 1993. Members of the Aum Shinrikyo cult successfully isolated and grew a large stock of anthrax bacteria, then sprayed it as an aerosol from the roof of a building in downtown Tokyo. The cult was well-financed, and had many highly educated members, so this release over the world’s largest city really represented a worst-case scenario. Nobody got sick or died. From the cult’s perspective, it was a complete and utter failure. Again, the only reason we even found out about it was a post-hoc confession. Aum members later demonstrated their lab skills by producing Sarin nerve gas, with far deadlier results. Lesson: one of the top “select agents” is extremely hard to grow and deploy even for relatively skilled non-state groups. It’s a really crappy bioterrorist weapon. Taken together, these events point to an uncomfortable but inevitable conclusion: our biodefense industry is a far greater threat to us than any actual bioterrorists.

### No Bio-Terror

#### No risk of bioterrorism.

Ivanov 2014 (Sandra Ivanov, postgraduate student at the National Centre for Peace and Conflict Studies at the University of Otago in New Zealand, 9-23-14, “HOW TO MAKE THE ‘EBOLA BOMB': WHY YOU SHOULD STOP WORRYING ABOUT BIOTERRORISM,” <http://cimsec.org/make-ebola-bomb-stop-worrying-bioterrorism/13069>) gz

Many studies from a health, as well as a humanities perspective, assume that terrorists could successfully generate biological or chemical agents and weaponise them. Taking this initial premise, a lot of literature has been based around this looming threat, subsequently offering policy advice, public health recommendations, and technological investment to avoid such catastrophes. However it would be useful to deconstruct this claim entirely. So I’ll begin by offering a baking recipe, to explore at the very core, what a group would need to do to successfully create a biological weapon, in this case, utilising the Ebola virus. Ingredients Firstly, any terrorist group wanting to create and weaponise a biological or chemical agent will need to have an appropriate kitchen. In the case of the Ebola virus, a standard biosafety level 4 (BSL-4) scene will be required (Adeline M. Nyamathi et al., “Ebola Virus: Immune Mechanisms of Protection and Vaccine Development“, Biological Research For Nursing 4, No. 4, April 2003: 276-281). Some features of these laboratories include decontamination mechanisms, pest management systems, air filters, and special suits. Sometimes the kitchen will have to be in a separate building, or in an isolated area within a building to meet the safety requirements. Not only will the kitchen be under strict conditions, the baking process will need to be kept in total secrecy. The constant threat of law enforcements raiding facilities, and intelligence and secret services detecting activities will have to be avoided. Also, there are only some fifty of these laboratories successfully maintained worldwide. Before starting, make sure there is a baking dish of ‘uncertainty’ readily available to just throw all of the following ingredients into: 1 Tablespoon of Proper Agent Initially, a terrorist group must decide what kind of agent they would like to use in a bioterror attack. This is one part of the recipe which can be modified, but the other ingredients will be standard for all types of attacks. The recent spread of the deadly Ebola virus will be the agent of choice for this bomb. Ebola is a virus which is passed to humans through contact with infected animals. The spread of the virus from person-to-person is brought about through blood and bodily fluids, as well as exposure to a contaminated environment. An infected live host with Ebola would need to be maintained in a human or animal – only a few animals are able to be used as hosts, such as primates, bats, and forest antelope. Although Ebola infection of animals through aerosol particles can be effective, it has not successfully been transferred with this method to humans (Manoj Karwa, Brian Currie and Vladimir Kvetan, “Bioterrorism: Preparing for the impossible or the improbable“, Critical Care Medicine 33, No. 1, January 2005: 75-95). 1 Bucket of Resources and Money In order to develop a biological weapon, a substantial amount of material and money is required. Investment is needed from the very outset – taking into account membership size and capabilities of a terrorist group, financial assets of a group, and making sure territory and proper infrastructure is available for the biological agent. For a successful bomb to be created, a group must think about the resources they will need for each stage of the baking process, such as weapons production, potential testing phases, and logistics, such as transportation and communications technologies (Victor H. Asal, Gary A. Ackerman and R. Karl Rethemeyer, “Connections Can Be Toxic: Terrorist Organizational Factors and the Pursuit of CBRN Terrorism“, National Consortium for the Study of Terrorism and Responses to Terrorism, 2006). Resources needed for an “Ebola Bomb” will most likely need to be imported from the outside, and a group must determine the feasibility of acquiring the materials and technologies needed for the bomb (Jean Pascal Zanders, “Assessing the risk of chemical and biological weapons proliferation to terrorists“, The Nonproliferation Review, Fall 1999: 17-34). A surplus of money would also be a smart idea in case technical difficulties arise. 5 Cups of Expertise With all the correct resources and necessary amount of monetary support, the recipe will require the right kind of know-how. For an operation like this, a terrorist group should have members with high levels of education and training in science, engineering, and technological development, to deal with highly virulent agents, and for successful weaponisation (Zanders). A group may need to be integrated into knowledge flows and institutions, or be able to recruit members to their cause with this specific expertise (Asal, Ackerman and Rethemeyer). Knowledge and expertise is required to create the correct strain, handling the agent, growing the agent with the desired characteristics, and maintaining the agent. Taking Ebola specifically requires synthesising proteins which make it infectious, and becomes a task that is difficult and unlikely to succeed (Amanda M. Teckma, “The Bioterrorist Threat of Ebola in East Africa and Implications for Global Health and Security“, Global Policy Essay, May 2013). If Ebola is successfully created in the kitchen, it is not itself a biological weapon – an expert will be required to transform the virus into a workable mechanism for dissemination. A Teaspoon of Risk The decision to use biological weapons for an attack is in itself extremely risky. There is a risk that bioterrorism could cause dissenting views among followers, and that public approval and opinion may channel the way a group operates. After all, terrorists are political communicators, wanting to bring attention to their grievances. If a group becomes polarised or resented by their actions, they will not see the benefits of pursuing certain methods. Terrorists want to send powerful messages, gain more members, in which these members assist to bring about certain plans and demands. Therefore, public opinion and political opportunism will be risked in a quest to create a bioweapon such as an “Ebola Bomb” (Zanders). Secondly, a terrorist group may be subject to more scrutiny or attention. This is why keeping activities covert will be a key to success. States will be more vigilant towards groups that are known to be seeking and acquiring biological and chemical capabilities (Asal, Ackerman and Rethemeyer). And finally, risk will always cling on to funding requirements, and potential technical difficulties in all stages of the bioweapon making process. A Fist of Time Now this recipe is going to take a while to prepare and bake in the oven, and there is no particular moment to determine when it should be removed from the baking dish. So, whatever group wants to make this bomb, will need to realise this is a long-term and complex effort. It will not work like most conventional weapons, which produce a high number of casualties with a single explosion, and that could be a reason why bioterrorism is not the most popular means for a violent attack – demanding time, effort, and resources without guarantees of a concrete result. A fist full of time may be needed so that knowledge, both tacit and explicit, can be acquired, as well as accounting for the various mistakes and learning curves to overcome (Asal, Ackerman and Rethemeyer). It can also refer to how long it will take to cook up, maintain and prepare a virus for an attack. It will take time to create a successful weapon with prior testing, and wait for the correct environmental conditions when it comes to dissemination. Time will have to be a group investment – it is not the kind of bomb that will detonate immediately. A Pinch of Curiosity of the Unknown The teaspoon of risk coincides with uncertainty, and there will need to be a commitment to potential unknown factors. It is unknown what will happen once a virus is disseminated. Will the weapon even work in the first place? Weather conditions are unpredictable and Ebola will not have a prominent effect in certain environments. What happens to the terrorist group if the attack fails? What happens to the reputation of the group and its membership, or will the group cease to exist? If the recipe is a success, it is impossible to control the biological agent which is released – not only can it affect the targeted population, but it may annihilate the terrorist group itself. There will be an unknown into potentially losing local and international support, and donors if this causes widespread catastrophe. Method: Weaponisation and Dissemination Mix that up good in your baking dish of what is now “deep uncertainty” and pop it in the oven to bake. But as time passes, it seems as though the ingredients are not rising. The process of turning a biological agent into a weapon for attack is the phase with the most hurdles for terrorist groups. In order for a virus to inflict a lot of harm, it has to be disseminated through an effective delivery mechanism. As mentioned previously, the Ebola virus needs a live host. Weaponising a live host is more difficult than other agents which can be cultured on dishes of nutrients. The process has many stages which involve testing, refining, upgrading, and toughening. The methods to disseminate an agent are only known to few people, and rarely published – it is not a basement project (Teckman). Let’s take Aum Shinrikyo as an example of conducting a bioterrorist attack (even it was “only” a chemical attack). This apocalyptic religious organisation in Japan managed to release sarin gas inside a Tokyo subway, killing a dozen people, and injuring 50. However, even with money and resources, they failed to effectively weaponise the chemical. Factors which led to their failure included internal secrecy and breakdown in communication; selecting members only solely dedicated to their cause to work on the weapons, ultimately employing unskilled people to operate and maintain the project, causing accidents and leaks (Zanders). Aum Shinrikyo’s attempt to disseminate botulinum toxin into Tokyo using a truck with a compressor and vents, did not work because they had not acquired an infectious strain (Sharon Begley, “Unmasking Bioterror“, Newsweek, 13.03.2010; “Chronology of Aum Shinrikyo’s CBW Activities“, Monterey Institute of International Studies, 2001). Finally, a major obstacle to successfully disseminating Ebola, is because this virus requires a specific environment in order to thrive. Weather conditions can be unpredictable, and Ebola particularly needs high temperatures and humidity to remain effective. Decoration: Results and Conclusions Obviously, this “Ebola Bomb” has not come close to containing the right requirements needed to explode. Looking back historically, pathogens, and all kinds of toxins have been used as tools in sabotage and assassinations since the beginning of time. Now, it would be silly to say this recipe will never work – there will always be a possibility that Ebola or other viruses may be used as biological weapons in the future. However, the likelihood of its development and use by a terrorist group is quite improbable. Mentioning Aum Shinrikyo again, they are an organisation which at the time, had a war chest of more than $300 million, with six laboratories and a handful of biologists, in the end having insurmountable difficulties with the weaponisation and dissemination processes, and killing a dozen people (Begley). There is a greater amount of knowledge and technology available in our day and age than in 1995 with the Aum Shinrikyo attacks, but it is still unlikely that this will be the weapon of choice. Examining state biological weapons programmes, Soviet Russia had almost 60,000 personnel employed in their weapons development, with only about 100 people that actually knew how to take an agent through the full production process. In the United States, at Fort Detrick, there were 250 buildings with 3,000 personnel, and it took them a while to weaponise a single agent, such as botulinum (Manoj Karwa, Brian Currie and Vladimir Kvetan). Nowadays, the narrative has assumed a worst case scenario analysis, and subsequently narrowed down bioterrorism to a single threat prognosis. There is little distinction made between what is conceivable and possible, and what is likely in terms of bioterrorism. Anything can be conceived as a terrorist threat, but what is the reality? The “Ebola Bomb” is not a danger. The likelihood of a bioterrorist attack remains highly unlikely (Teckman). The focus should be on preventing natural pandemics of human disease, such as tuberculosis, SARS, AIDS and influenza – emphasis placed on how we can cure diseases, and how medical training could be improved to contain, and avoid viruses such as Ebola altogether. Resources are being pumped into biodefence in the security as well as the medical sector, but preparedness and investment in bioterrorism needs to be in proportion to actual threats, otherwise, funds are diverted away from much needed public health programmes: The effectiveness of biological weapons has never been clearly shown, the numbers of casualties have been small and it is likely that hoaxes and false alarms in the future will continue to outnumber real events and create disruptive hysteria (Manoj Karwa, Brian Currie and Vladimir Kvetan). Emphasis needs to be back on medical research, as well as social science investigations into the roots of why terrorist groups would even want to pursue biological weapons, and the lengths they would go to use them. Let this be an avenue for further pondering and exploring, the realities of bioterrorism.

#### No bioterrorism—their impact is hype.

Davenport 14 (Mason Ryan Davenport is a MA candidate @ American Public University. “The Lingering Specter of Bioterrorism: Assessing Al-Qaeda ’s Intent and Capability to Use Biological Weapons against the U.S.” <http://digitalcommons.apus.edu/cgi/viewcontent.cgi?article=1022&context=theses&sei-redir=1&referer=https%3A%2F%2Fscholar.google.com%2Fscholar%3Fstart%3D20%26q%3Dbioterror%26hl%3Den%26as_sdt%3D0%2C47%26as_ylo%3D2015#search=%22bioterror%22>) 5/19/15 RK

A slew of academic papers refute much of Washington’s furor over alQaeda’s bioweapons program. Seemingly, discussions in the Legislative and Executive branches mainly revolve around generalizations or outright misinformation. Rolf Mowatt-Larssen, a former Central Intelligence Agency (CIA) officer, provides a pointed case study in this regard. Titled “Al-Qaeda Weapons of Mass Destruction Threat: Hype of Reality?,” the report investigates the veracity of a U.S. government-issued warning from 2003 in which an al-Qaeda WMD attack was predicted within two-year’s time (Mowatt-Larssen 2010a). Likewise, a predicted 2013 attack of a biological or chemical nature, as written in 2008 by Congress’s Graham/Talent WMD Commission, also failed to materialize (Sharoff 2011). Mowatt-Larssen, a former Director of Intelligence and Counterintelligence at the U.S. Specter of Bioterrorism 14 Department of Energy, could be considered one of the foremost authorities on the subject of WMD-terrorism as his work is frequently referenced in other papers. His report presents a chronology of al-Qaeda WMD items of interest from 1998 to 2003, allowing the reader to draw their own conclusions about the legitimacy of the 2003 warning. However, MowattLarssen does pose the question as to whether the threat was “hyped for political purposes” (Mowatt-Larssen 2010a, 9). Leonard Cole’s article in the Combating Terrorism Center (CTC) Sentinel, “Bioterrorism: Still a Threat to the United States,” takes D.C. to task over bloated and “misapplied” biodefense spending (Cole 2013, 10). Simply put, Cole’s argument is similar to those of other detractors: Washington excels at exaggerating the bioterrorism threat. For evidence of Washington’s propensity to overstate the bioterror threat, most scholars refer to standard U.S. bioterror exercise scenarios. Clark emphasizes that these scenarios are “extreme…often inflating the capabilities of the terrorists” (Clark 2008a, 19). Leonard Cole echoes this sentiment, writing that “descriptions of possible bioterrorism scenarios are often hyperbolic” (Cole 2012, 11). Ostensibly, most U.S. bioterrorism exercise scenarios were noted as having a tendency for oversimplification: “scenarios for national biological weapons (BW) exercises that posit various BW agents in advanced states of preparation in the hands of terrorist groups Specter of Bioterrorism 15 simply disregard the requirements in knowledge and practice that such groups would need in order to work with pathogens” (Leitenberg 2005, 88). One of the more unfortunate aspects of the U.S.’s effort to counter bioterrorism is the fact that it may be giving extremists a ‘playbook’ they didn’t previously have: “years of widely broadcast public discussion has provided such groups, at least on a general level, with suggestions as to what paths to follow” (Leitenberg 2005, 88). Ayman al-Zawahiri, al-Qaeda’s current leader, is even on record admitting that the terror group didn’t put much thought into biological weapons until the U.S. Congress started sounding the alarm in the ‘90s. In “Revisiting Al-Qaeda’s Anthrax Program,” authors Rene Pita and Rohan Gunaratna break down the group’s early biological weapons program. They focus particular attention upon an electronic message sent by al-Zawahiri to Mohammed Atif (former military chief of al-Qaeda): “Despite [bioweapons’] extreme danger, we only became aware of them when the enemy drew our attention to them by repeatedly expressing concerns that they can be produced simply with easily available materials…” (Pita and Gunaratna 2009, 10). Tellingly, the terror outfit only began its push for a bioweapons research laboratory after Secretary of Defense Cohen’s dramatic press hearing with the bag of sugar meant to represent anthrax. Still, as previously covered, aspirations alone don’t really equate to successful enterprise. Many researchers note how Aum Shinrikyo failed to acquire or cultivate a lethal pathogen despite significant financial backing and state-of-the-art laboratories. Al-Qaeda has never come close to the capability of Aum Shinrikyo. For similar reasons, fears of lone-wolf bioterrorism appear just as implausible. Ellis surmises that lone wolf bioterror threats are most probable when it is an “insider” as it was in the case of Amerithrax (Ellis 2014, 214). Some of the literature uncovered during preliminary research showed a strong inclination, by researchers, to group biological weapons into the broader WMD / CBRN category: the Ellis, Mowatt-Larssen, and Salama/Hansell reports are all prime examples of this trend. This approach was considered as having a negative impact on this research paper’s main aim. Basically, viewing biological weapons on the same terms as nuclear and chemical issues marginalizes what could otherwise be a concise appreciation of al-Qaeda’s bioweapons agenda. Tucker’s report follows a similar, if slightly different model: it lumps biological weapons with chemical ones (not nuclear or radiological) (Tucker 2009). Chemical weapons are often grouped with bioweapons in their own distinct category (CB), but doing so glosses over the many distinct differences between chemical and biological weapons. For one, research indicates that chemical weapons, while presenting the same dispersal challenges, are far more readily available than biological ones. An interesting notion is that the last decade’s worth of preventative measures, on the part of the U.S. and other Western nations, may have forced al-Qaeda to rethink bioweapons entirely. A chief contention is that Specter of Bioterrorism 17 D.C.’s consistent trend towards hyperbole, when framing the bioterrorism threat, has inevitably led to a stronger national defense against biological weapons. Potentially, bioweapons may now be ill-suited to extremist aims of high-visibility, high-casualty attacks. For instance, “the U.S. has now developed vaccines or drugs to counter most known conventional pathogens”

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(Clark 2008a, 183). Project BioShield, established in 2004, provides U.S.-based drug companies with a monetary incentive to develop, produce, and stockpile various vaccines and drugs that would otherwise have no commercial appeal. Mark Sharoff and Leonard Cole each contend that Project BioShield has been largely ineffective in its main objective; yet, regardless of some high-profile failures in the program (VaxGen’s unstable anthrax vaccine), increased budgetary allotments are nevertheless considered a worthy enterprise since even one new vaccine further limits terrorists’ options. The BioWatch program involves air samplers in several U.S. cities in order to detect aerosolized pathogens. The Department of Homeland Security’s (DHS’s) development of the Strategic National Stockpile and ‘push packages’, pre-packaged, rapidly deployable cargo containers full of vaccines and other medical supplies, further diminishes the impact and extent of any prospective bioterror incident (Clark 2008a, 114). Due to all the hype surrounding the issue of bioterrorism, some experts urge policymakers, and the general public, to put the threat in context. Clark and Leitenberg each contrast bioterrorism with other modern- Specter of Bioterrorism 18 day global issues that pose far greater danger to the U.S. way-of-life. Clark actually ends his book with a discussion of climate change, saying “challenges in the years ahead…make bioterrorism pale in comparison” (Clark 2008a, 190). Leitenberg also compares the threat of bioterrorism with that of climate change plus several additional planet-spanning problems: ocean pollution, population growth, war, poverty, nuclear terrorism, and naturally-occurring pandemics / epidemics (Leitenberg 2005, pp. 2-3). In light of the magnitude of these issues, such as HIV / AIDS already killing 5 million people “year in, year out”, these comparisons reveal a sense of imbalance in U.S. national security priorities (Leitenberg 2005, 3). Compellingly, Rolf Mowatt-Larssen proffers the hypothesis that al-Qaeda could be engaging in a “deception ruse”: continually drawing attention to their supposed desire for bioweapons if only to put the U.S. off the scent of their legitimate tactics (Mowatt-Larssen 2010a, 8). This concept certainly warrants further investigation. Assumptions about al-Qaeda’s plans to pursue biological weapons over easier-to-acquire and less problematic conventional attack means has not really been explored in depth. 21st century terror attacks thus far have involved predominantly small-arms and improvised explosive devices (IEDs). Much of the literature demonstrates distinctly Western mindsets (when regarding terrorism) or, at least, views bioterrorism through the scope of U.S.-specific defense concerns. There is an evident desire among U.S. Specter of Bioterrorism 19 politicians and scientists to boost their cases for increased biodefense budgets or, as Leitenberg puts it, “a small coterie of individuals constantly calls for increasing [biodefense] expenditures still further” (Leitenberg 2011). This fact alone has unnecessarily complicated academic research into bioterrorism since 9/11. Furthermore, the literature overwhelmingly indicates that a biological attack on the homeland is far from the apocalyptic scenario that Congress and the White House typically portrays; a bioterror attack on U.S. soil is likely to cause “disruptions rather than mass casualties” (Ellis 2014, p. 220). Incidentally, the numerous statements and press releases from al-Qaeda primarily serve as propaganda, making it difficult to differentiate between genuine intent and fear-mongering.

#### No impact to bioterror

Synthetic biology is hard, terrorists won’t do it – empirics, scale up, storage, dissemination, tech, logistical, healthy people, public health

Dvorsky 14 [George Dvorsky contributing editor at io9 and producer of the Sentient Developments blog and podcast. Dvorsky currently serves as Chair of the Board for the Institute for Ethics and Emerging Technologies 9-19-2014 http://io9.com/are-the-threats-from-synthetic-bioweapons-being-exagger-1636829313]

The advent of synthetic biology and DNA synthesis has raised concern that amateurs will use these technologies to turn pathogens into weapons of mass destruction. But as **experts point out**, this may be **far easier said than done.** As argued by Catherine Jefferson, Filippa Lentzos, and Claire Marris — all researchers in the Department of Social Science, Health, and Medicine at King's College London — there are several dominating narratives currently permeating scientific and policy discussions on the security threat posted by synthetic biology. They can be summarized like this: Synthetic biology is making it easier for non-experts to manipulate dangerous pathogens and, therefore, making it easier for terrorists to concoct bioweapons. Synthetic biology has led to the growth of a do-it-yourself biology community that could offer dual-use knowledge and equipment to bioterrorists seeking to do harm. DNA synthesis has become cheaper and can be out-sourced, making it easier for terrorists to obtain the basic materials to create biological threat agents. Non-experts could use synthetic biology to design radically new pathogens. Terrorists want to pursue biological weapons for high-consequence, mass- casualty attacks. But these narratives, they say, rely on several **misleading assumptions**: **Synthetic biology is not easy**, DIY biology is not particularly sophisticated, building a dangerous virus from scratch is hard — and even experts have a hard time enhancing disease pathogens. Perhaps alarmingly — at least to me — the authors claim that the bioterror weapons of mass destruction is a myth: The first [dimension of this myth] involves the identities of terrorists and what their intentions are. The assumption is that terrorists would seek to produce mass-casualty weapons and pursue capabilities on the scale of 20th century, state-level bioweapons programs. Most leading biological disarmament and non-proliferation experts believe that the risk of a small-scale bioterrorism attack is very real and present. But they consider the risk of sophisticated large-scale bioterrorism attacks to be **quite small**. This judgment is backed up by **historical evidence**. The three confirmed attempts to use biological agents against humans in terrorist attacks in the past were **small-scale**, **low-casualty events** aimed at causing panic and disruption rather than excessive death tolls. The second dimension involves capabilities and the level of skills and resources available to terrorists. The implicit assumption is that producing a pathogenic organism equates to producing a weapon of mass destruction. It does not. **Considerable knowledge and resources are necessary** for the processes of **scaling up**, **storage**, and **dissemination**. These processes present **significant technical and logistical barriers**. They go on to argue that, even if a bioweapon were to be disseminated successfully, the outcome of the attack could be affected by other factors, like the "**the health of the people** who are exposed and the speed and manner with which **public health** authorities and medical professionals detect and respond to the resulting outbreak."

#### Terrorist can’t obtain and correctly deploy bioweapons

Ouagrham-Gormley 14 – Assistant Professor of Public and International Affairs at George Mason University, Monterey Institute for International Studies, research director of the James Martin Center for Nonproliferation Studies office in Kazakhstan , founding editor of the International Export Control Observer (Sonia Ben, Cornell University Press, November 2014, “Barriers to Bioweapons”, http://www.cornellpress.cornell.edu/book/?GCOI=80140100857780)

In both the popular imagination and among lawmakers and national security experts, there exists the belief that with sufficient motivation and material resources, states or terrorist groups can produce bioweapons easily, cheaply, and successfully. In Barriers to Bioweapons, Sonia Ben Ouagrham-Gormley challenges this perception by showing that bioweapons development is a difficult, protracted, and expensive endeavor, rarely achieving the expected results whatever the magnitude of investment. Her findings are based on extensive interviews she conducted with former U.S. and Soviet-era bioweapons scientists and on careful analysis of archival data and other historical documents related to various state and terrorist bioweapons programs. Bioweapons development relies on living organisms that are sensitive to their environment and handling conditions, and therefore behave unpredictably. These features place a greater premium on specialized knowledge. Ben Ouagrham-Gormley posits that lack of access to such intellectual capital constitutes the greatest barrier to the making of bioweapons. She integrates theories drawn from economics, the sociology of science, organization, and management with her empirical research. The resulting theoretical framework rests on the idea that the pace and success of a bioweapons development program can be measured by its ability to ensure the creation and transfer of scientific and technical knowledge. The specific organizational, managerial, social, political, and economic conditions necessary for success are difficult to achieve, particularly in covert programs where the need to prevent detection imposes managerial and organizational conditions that conflict with knowledge production.

#### No risk of bioterror

**Keller 13** (Rebecca, 7 March 2013, Analyst at Stratfor, “Bioterrorism and the Pandemic Potential,” Stratfor, http://www.stratfor.com/weekly/bioterrorism-and-pandemic-potential)

The risk of an accidental release of H5N1 is similar to that of other infectious pathogens currently being studied. Proper safety standards are key, of course, and experts in the field have had a year to determine the best way to proceed, balancing safety and research benefits. Previous work with the virus was conducted at biosafety level three out of four, which requires researchers wearing respirators and disposable gowns to work in pairs in a negative pressure environment. While many of these labs are part of universities, access is controlled either through keyed entry or even palm scanners. There are roughly 40 labs that submitted to the voluntary ban. Those wishing to resume work after the ban was lifted must comply with guidelines requiring strict national oversight and close communication and collaboration with national authorities. The risk of release either through accident or theft cannot be completely eliminated, but given the established parameters **the risk is minimal**. The use of the pathogen as a biological weapon requires an assessment of whether a non-state actor would have the capabilities to isolate the virulent strain, then weaponize and distribute it. Stratfor has long held the position that while terrorist organizations may have rudimentary capabilities regarding biological weapons, the **likelihood** of a **successful attack** is **very low**. Given that the laboratory version of H5N1 -- or any influenza virus, for that matter -- is a contagious pathogen, there would be two possible modes that a non-state actor would have to instigate an attack. The virus could be refined and then aerosolized and released into a populated area, or an individual could be infected with the virus and sent to freely circulate within a population. There are **severe constraints** that make **success** using either of these methods **unlikely**. The technology needed to refine and aerosolize a pathogen for a biological attack is **beyond the capability** of most non-state actors. Even if they were able to develop a weapon, other factors such as **wind patterns** and **humidity** can render an attack **ineffective**. Using a human carrier is a less expensive method, but it requires that the biological agent be a contagion. Additionally, in order to infect the large number of people necessary to start an outbreak, the infected carrier must be mobile while contagious, something that is **doubtful** with a **serious disease** like small pox. The carrier also cannot be visibly ill because that would limit the necessary human contact.

#### The worst case scenarios have already occurred.

Dove 12 - Alan Dove, PhD in Microbiology, science journalist and former Adjunct Professor at New York University, “Who’s Afraid of the Big, Bad Bioterrorist?” Jan 24 2012, http://alandove.com/content/2012/01/whos-afraid-of-the-big-bad-bioterrorist/

The second problem is much more serious. Eliminating the toxins, we’re left with a list of infectious bacteria and viruses. With a single exception, these organisms are probably near-useless as weapons, and history proves it.¶There have been at least three well-documented military-style deployments of infectious agents from the list, plus one deployment of an agent that’s not on the list. I’m focusing entirely on the modern era, by the way. There are historical reports of armies catapulting plague-ridden corpses over city walls and conquistadors trying to inoculate blankets with Variola (smallpox), but it’s not clear those “attacks” were effective. Those diseases tended to spread like, well, plagues, so there’s no telling whether the targets really caught the diseases from the bodies and blankets, or simply picked them up through casual contact with their enemies.¶ Of the four modern biowarfare incidents, two have been fatal. The first was the 1979 Sverdlovsk anthrax incident, which killed an estimated 100 people. In that case, a Soviet-built biological weapons lab accidentally released a large plume of weaponized Bacillus anthracis (anthrax) over a major city. Soviet authorities tried to blame the resulting fatalities on “bad meat,” but in the 1990s Western investigators were finally able to piece together the real story. The second fatal incident also involved anthrax from a government-run lab: the 2001 “Amerithrax” attacks. That time, a rogue employee (or perhaps employees) of the government’s main bioweapons lab sent weaponized, powdered anthrax through the US postal service. Five people died.¶That gives us a grand total of around 105 deaths, entirely from agents that were grown and weaponized in officially-sanctioned and funded bioweapons research labs. Remember that.¶ Terrorist groups have also deployed biological weapons twice, and these cases are very instructive. The first was the 1984 Rajneeshee bioterror attack, in which members of a cult in Oregon inoculated restaurant salad bars with Salmonella bacteria (an agent that’s not on the “select” list). 751 people got sick, but nobody died. Public health authorities handled it as a conventional foodborne Salmonella outbreak, identified the sources and contained them. Nobody even would have known it was a deliberate attack if a member of the cult hadn’t come forward afterward with a confession. Lesson: our existing public health infrastructure was entirely adequate to respond to a major bioterrorist attack.¶Thesecond genuine bioterrorist attack took place in 1993. Members of the Aum Shinrikyo cult successfully isolated and grew a large stock of anthrax bacteria, then sprayed it as an aerosol from the roof of a building in downtown Tokyo. The cult was well-financed,and had many highly educated members, so this release over the world’s largest city really represented a worst-case scenario.¶Nobody got sick or died. From the cult’s perspective, it was a complete and utter failure. Again, the only reason we even found out about it was a post-hoc confession. Aum members later demonstrated their lab skills by producing Sarin nerve gas, with far deadlier results. Lesson: one of the top “select agents” is extremely hard to grow and deploy even for relatively skilled non-state groups. It’s a really crappy bioterrorist weapon.¶ Taken together, these events point to an uncomfortable but inevitable conclusion: our biodefense industry is a far greater threat to us than any actual bioterrorists.

#### No motive or means for bioterrorism

**Hoffman**, Georgetown security studies director, 20**14**

(Bruce, “Low-Tech Terrorism”, April, nationalinterest.org/print/article/low-tech-terrorism-9935)

Fortunately, the report’s most breathless prediction concerning the likelihood of terrorist use of weapons of mass destruction (WMD) has not come to pass. But this is not for want of terrorists trying to obtain such capabilities. Indeed, prior to the October 2001 U.S.-led invasion of Afghanistan, Al Qaeda had embarked upon an ambitious quest to acquire and develop an array of such weapons that, had it been successful, would have altered to an unimaginable extent our most basic conceptions about national security and rendered moot debates over whether terrorism posed a potentially existential threat. But just how effective have terrorist efforts to acquire and use weapons of mass destruction actually been? The September 11, 2001, attacks were widely noted for their reliance on relatively low-tech weaponry—the conversion, in effect, of airplanes into missiles by using raw physical muscle and box cutters to hijack them. Since then, efforts to gain access to WMD have been unceasing. But examining those efforts results in some surprising conclusions. While there is no cause for complacency, they do suggest that terrorists face some inherent constraints that will be difficult for them to overcome. It is easier to proclaim the threat of mass terror than to perpetrate it. THE TERRORIST ATTACKS attacks on September 11 completely recast global perceptions of threat and vulnerability. Long-standing assumptions that terrorists were more interested in publicity than in killing were dramatically swept aside in the rising crescendo of death and destruction. The butcher’s bill that morning was without parallel in the annals of modern terrorism. Throughout the entirety of the twentieth century no more than fourteen terrorist incidents had killed more than a hundred people, and until September 11 no terrorist operation had ever killed more than five hundred people in a single attack. Viewed from another perspective, more than twice as many Americans perished within those excruciating 102 minutes than had been killed by terrorists since 1968—the year widely accepted as marking the advent of modern, international terrorism. So massive and consequential a terrorist onslaught naturally gave rise to fears that a profound threshold in terrorist constraint and lethality had been crossed. Renewed fears and concerns were in turn generated that terrorists would now embrace an array of deadly nonconventional weapons in order to inflict even greater levels of death and destruction than had occurred that day. Attention focused specifically on terrorist use of WMD, and the so-called Cheney Doctrine emerged to shape America’s national-security strategy. The doctrine derived from former vice president Dick Cheney’s reported statement that “if there’s a one percent chance that Pakistani scientists are helping Al Qaeda build or develop a nuclear weapon, we have to treat it as a certainty in terms of our response.” What the “one percent doctrine” meant in practice, according to one observer, was that “even if there’s just a one percent chance of the unimaginable coming due, act as if it’s a certainty.” Countering the threat of nonconventional-weapons proliferation—whether by rogue states arrayed in an “axis of evil” or by terrorists who might acquire such weapons from those same states or otherwise develop them on their own—thus became one of the central pillars of the Bush administration’s time in office. In the case of Al Qaeda, at least, these fears were more than amply justified. That group’s interest in acquiring a nuclear weapon reportedly commenced as long ago as 1992—a mere four years after its creation. An attempt by an Al Qaeda agent to purchase uranium from South Africa was made either late the following year or early in 1994 without success. Osama bin Laden’s efforts to obtain nuclear material nonetheless continued, as evidenced by the arrest in Germany in 1998 of a trusted senior aide named Mamdouh Mahmud Salim, who was attempting to purchase enriched uranium. And that same year, the Al Qaeda leader issued a proclamation in the name of the “International Islamic Front for Fighting the Jews and Crusaders.” Titled “The Nuclear Bomb of Islam,” the proclamation declared that “it is the duty of Muslims to prepare as much force as possible to terrorize the enemies of God.” When asked several months later by a Pakistani journalist whether Al Qaeda was “in a position to develop chemical weapons and try to purchase nuclear material for weapons,” bin Laden replied: “I would say that acquiring weapons for the defense of Muslims is a religious duty.” Bin Laden’s continued interest in nuclear weaponry was also on display at the time of the September 11 attacks. Two Pakistani nuclear scientists named Sultan Bashiruddin Mahmood and Abdul Majeed spent three days that August at a secret Al Qaeda facility outside Kabul. Although their discussions with bin Laden, his deputy Ayman al-Zawahiri and other senior Al Qaeda officials also focused on the development and employment of chemical and biological weapons, Mahmood—the former director for nuclear power at Pakistan’s Atomic Energy Commission—claimed that bin Laden’s foremost interest was in developing a nuclear weapon. The movement’s efforts in the biological-warfare realm, however, were far more advanced and appear to have begun in earnest with a memo written by al-Zawahiri on April 15, 1999, to Muhammad Atef, then deputy commander of Al Qaeda’s military committee. Citing articles published in Science, the Journal of Immunology and the New England Journal of Medicine, as well as information gleaned from authoritative books such as Tomorrow’s Weapons, Peace or Pestilence and Chemical Warfare, al-Zawahiri outlined in detail his thoughts on the priority to be given to developing a biological-weapons capability. One of the specialists recruited for this purpose was a U.S.-trained Malaysian microbiologist named Yazid Sufaat. A former captain in the Malaysian army, Sufaat graduated from the California State University in 1987 with a degree in biological sciences. He later joined Al Gamaa al-Islamiyya (the “Islamic Group”), an Al Qaeda affiliate operating in Southeast Asia, and worked closely with its military operations chief, Riduan Isamuddin, better known as Hambali, and with Hambali’s own Al Qaeda handler, Khalid Sheikh Mohammed—the infamous KSM, architect of the September 11 attacks. In January 2000, Sufaat played host to two of the 9/11 hijackers, Khalid al-Midhar and Nawaf Alhazmi, who stayed in his Kuala Lumpur condominium. Later that year, Zacarias Moussaoui, the alleged “twentieth hijacker,” who was sentenced in 2006 to life imprisonment by a federal district court in Alexandria, Virginia, also stayed with Sufaat. Under KSM’s direction, Hambali and Sufaat set up shop at an Al Qaeda camp in Kandahar, Afghanistan, where their efforts focused on the weaponization of anthrax. Although the two made some progress, biowarfare experts believe that on the eve of September 11 Al Qaeda was still at least two to three years away from producing a sufficient quantity of anthrax to use as a weapon. Meanwhile, a separate team of Al Qaeda operatives was engaged in a parallel research-and-development project to produce ricin and chemical-warfare agents at the movement’s Derunta camp, near the eastern Afghan city of Jalalabad. As one senior U.S. intelligence officer who prefers to remain anonymous explained, “Al Qaeda’s WMD efforts weren’t part of a single program but rather multiple compartmentalized projects involving multiple scientists in multiple locations.” The Derunta facility reportedly included laboratories and a school that trained handpicked terrorists in the use of chemical and biological weapons. Among this select group was Kamal Bourgass, an Algerian Al Qaeda operative who was convicted in British courts in 2004 and 2005 for the murder of a British police officer and of “conspiracy to commit a public nuisance by the use of poisons or explosives.” The school’s director was an Egyptian named Midhat Mursi—better known by his Al Qaeda nom de guerre, Abu Kebab—and among its instructors were a Pakistani microbiologist and Sufaat. When U.S. military forces overran the camp in 2001, evidence of the progress achieved in developing chemical weapons as diverse as hydrogen cyanide, chlorine and phosgene was discovered. Mursi himself was killed in 2008 by a missile fired from a U.S. Predator drone. Mursi’s death dealt another significant blow to Al Qaeda’s efforts to develop nonconventional weapons—but it did not end them. In fact, as the aforementioned senior U.S. intelligence officer recently commented, “Al Qaeda’s ongoing procurement efforts have been well-established for awhile now . . . They haven’t been highlighted in the U.S. media, but that isn’t the same as it not happening.” In 2010, for instance, credible intelligence surfaced that Al Qaeda in the Arabian Peninsula—widely considered the movement’s most dangerous and capable affiliate—was deeply involved in the development of ricin, a bioweapon made from castor beans that the FBI has termed the third most toxic substance known, behind only plutonium and botulism. Then, in May 2013, Turkish authorities seized two kilograms of sarin nerve gas—the same weapon used in the 1995 attack on the Tokyo subway system—and arrested twelve men linked to Al Qaeda’s Syrian affiliate, Al Nusra Front. Days later, another set of sarin-related arrests was made in Iraq of Al Qaeda operatives based in that country who were separately overseeing the production of sarin and mustard blistering agents at two or more locations. Finally, Israel admitted in November 2013 that for the past three years it had been holding a senior Al Qaeda operative whose expertise was in biological warfare. “The revelations over his alleged biological weapons links,” one account noted of the operative’s detention, “come amid concerns that Al Qaeda affiliates in Syria are attempting to procure bioweapons—and may already have done so.” Indeed, Syria’s ongoing civil war and the prominent position of two key Al Qaeda affiliates—Al Nusra Front and the Islamic State of Iraq and the Levant—along with other sympathetic jihadi entities in that epic struggle, coupled with the potential access afforded to Bashar al-Assad’s chemical-weapons stockpiles, suggest that we have likely not heard the last of Al Qaeda’s ambitions to obtain nerve agents, poison gas and other harmful toxins for use as mass-casualty weapons. NONETHELESS, A fundamental paradox appears to exist so far as terrorist capabilities involving chemical, biological and nuclear weapons are concerned. As mesmerizingly attractive as these nonconventional weapons remain to Al Qaeda and other terrorist organizations, they have also mostly proven frustratingly disappointing to whoever has tried to use them. Despite the extensive use of poison gas during World War I, for instance, this weapon accounted for only 5 percent of all casualties in that conflict. Reportedly, it required some sixty pounds of mustard gas to produce even a single casualty. Even in more recent times, chemical weapons claimed the lives of less than 1 percent (five thousand) of the six hundred thousand Iranians who died in the Iran-Iraq war. The Japanese cult Aum Shinrikyo succeeded in killing no more than thirteen people in its attack on the Tokyo underground in 1995. And, five years earlier, no fatalities resulted from a Tamil Tigers assault on a Sri Lankan armed forces base in East Kiran that employed chlorine gas. In fact, the wind changed and blew the gas back into the Tigers’ lines, thus aborting the attack. Biological weapons have proven similarly difficult to deploy effectively. Before and during World War II, the Imperial Japanese Army carried out nearly a dozen attacks using a variety of germ agents—including cholera, dysentery, bubonic plague, anthrax and paratyphoid, disseminated through both air and water—against Chinese forces. Not once did these weapons decisively affect the outcome of a battle. And, in the 1942 assault on Chekiang, ten thousand Japanese soldiers themselves became ill, and nearly two thousand died, from exposure to these agents. “The Japanese program’s principal defect, a problem to all efforts so far,” the American terrorism expert David Rapoport concluded, was “an ineffective delivery system.” The challenges inherent in using germs as weapons are borne out by the research conducted for more than a decade by Seth Carus, a researcher at the National Defense University. Carus has assembled perhaps the most comprehensive database of the use of biological agents by a wide variety of adversaries, including terrorists, government operatives, ordinary criminals and the mentally unstable. His exhaustive research reveals that no more than a total of ten people were killed and less than a thousand were made ill as a result of about two hundred incidents of bioterrorism or biocrime. Most of which, moreover, entailed the individual poisoning of specific people rather than widespread, indiscriminate attacks. The formidable challenges of obtaining the material needed to construct a nuclear bomb, along with the fabrication and dissemination difficulties involving the use of noxious gases and biological agents, perhaps account for the operational conservatism long observed in terrorist tactics and weaponry. As politically radical or religiously fanatical as terrorists may be, they nonetheless to date have overwhelmingly seemed to prefer the tactical assurance of the comparatively modest effects achieved by the conventional weapons with which they are familiar, as opposed to the risk of failure inherent in the use of more exotic means of death and destruction. Terrorists, as Brian Jenkins famously observed in 1985, thus continue to “appear to be more imitative than innovative.” Accordingly, what innovation does occur tends to take place in the realm of the clever adaptation or modification of existing tactics—such as turning hijacked passenger airliners into cruise missiles—or in the means and methods used to fabricate and detonate explosive devices, rather than in the use of some new or dramatically novel weapon. THE TERRORISTS have thus functioned mostly in a technological vacuum: either aloof or averse to the profound changes that have fundamentally altered the nature of modern warfare. Whereas technological progress has produced successively more complex, lethally effective and destructively accurate weapons systems that are deployed from a variety of air, land, sea—and space—platforms, terrorists continue to rely, as they have for more than a century, on the same two basic “weapons systems”: the gun and the bomb. Admittedly, the guns used by terrorists today have larger ammunition capacities and more rapid rates of fire than the simple revolver the Russian revolutionary Vera Zasulich used in 1878 to assassinate the governor-general of St. Petersburg. Similarly, bombs today require smaller amounts of explosives that are exponentially more powerful and more easily concealed than the sticks of TNT with which the Fenian dynamiters terrorized London more than a century ago. But the fact remains that the vast majority of terrorist incidents continue to utilize the same two attack modes.