

Media of Mass Destruction: How Fake News is Killing Italy's Olive Trees

by

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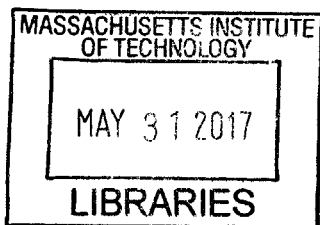
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ABSTRACT

In 2013, the plant pathogen *Xylella fastidiosa* was found in Salento, Italy's most southeastern region, famous for its centuries-old olive trees. Spread by insects, the bacterium is decimating those trees and compromising the production of olive oil, which accounts for a considerable part of the national output. Since there are no means to cure sick plants, the authorities ordered emergency measures to contain the disease, which included removing infected trees and using pesticides against insect vectors.

In Salento, these measures aroused intense public opposition. Following a vilifying media campaign and under public pressure, an Italian court halted the containment measures and accused the scientists who detected *Xylella* as having caused the problem in the first place. The absence of a plan to contain the epidemic, the criminal charges against the scientists, and the public resistance due to inaccurate information may fuel the spread of the disease to the rest of Italy and eventually to the entire Mediterranean basin, with catastrophic economic consequences.

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It was a warm night in August 2013 and Donato Boscia, head of a plant pathology laboratory at the National Research Council in Italy, had just arrived at his in-laws' house in Taviano, a small town in Salento. Boscia was dining on the white porch when his father-in-law, a 84-year-old retired *Carabiniere*—a member of the Italian paramilitary police—approached him, concerned. The olive trees that he had inherited from his father had inexplicably started to dry out a few months before. Even after pruning, the trees did not recover.

Salento is the “heel” of Italy, a thin peninsula that juts south into the Mediterranean Sea for 100 miles and is famous for its pristine beaches and the baroque churches of its capital, Lecce. The arid soil, due to hot summers and mild, rainless winters, makes it difficult for plants to grow. The only ones that can tolerate the climate are the olive trees. These strong trees have grown in the region for centuries, providing wealth to generations of people.

“*L'oiu te ulia lu male porta via,*” people in Salento used to say. In English, “olive oil takes away all ills.” Olive owners would leave their trees as a valuable inheritance to their children. Until a few decades ago, every time a baby was born, an olive tree was planted as a symbol of a long, peaceful, and prosperous life. Today, with over 11 million olive trees, Salento produces around 12 percent of the national olive oil, contributing to make Italy the second largest producer in the world after Spain¹.

The morning after their conversation, Boscia and his father-in-law drove along the narrow, dirt roads in the fields outside the house to take a look at the olive trees. “As soon as I saw them, I thought there was something wrong,” Boscia told me. All the surrounding olive groves presented the same symptoms: scorched, brown canopies, and withered fruits.

Alarmed, Boscia alerted a handful of colleagues, and asked for the help of his mentor Giovanni Martelli, Professor Emeritus at the University of Bari. Martelli had spent some time at the University of California, Davis in the 1960s studying grapevine diseases. One he remembered was Pierce's disease, caused by the bacterium *Xylella fastidiosa*, a microbial killer of vines, peach, and citrus trees². Martelli suggested checking the trees for *Xylella*, though the bacterium was usually only found on the American continent.

The scientists working with Boscia collected and analyzed samples from trees that showed the scorching symptoms. They found *Xylella* DNA sequences in all the samples. Incredulous, Boscia had the tests repeated. The following day, the scientists got the same results. The DNA sequences found in sick plants belonged unambiguously to *Xylella fastidiosa*.

Xylella first appeared in the 1880s, when it began ravaging the vineyards of the Santa Ana valley near Los Angeles, California. By the late 1990s, the bacterium had become one of the most dreaded plant pathogens of the Americas³.

In Brazil, *Xylella* affects 40 percent of orange trees, causing losses of over 100 million dollars each year⁴. In the United States, the bug is widely distributed through grape-growing regions, from Florida to California. In California alone, grape growers lose over 55 million dollars annually⁵.

Xylella proliferates in a plant's xylem, the system of water-carrying vessels. By clogging these ducts, the bacteria deprive shoots and leaves of nourishment. Starved, plants eventually die⁶. *Xylella* is spread over long distances by insect vectors⁷ and infects over 350 plant species, including coffee, peach, and almond trees⁸.

In Salento, the bacterium has currently devastated an area of around 900 square miles—about the size of Rhode Island⁹. “The rapid olive decline in Salento is an epidemic of historical proportion, like the potato blight in Ireland, the coffee rust in the British colony Ceylon—which is pretty much why British people drink tea instead of coffee—and the chestnut blight in North America, which exterminated one of the main forest trees of Eastern U.S.,” said Alexander Purcell, Professor Emeritus at UC Berkeley, where he has studied plant diseases caused by *Xylella* for almost 40 years.

Since there is currently no way to cure infected plants, scientists and growers can only hope to contain the spread of the bacterium by uprooting infected trees and using pesticides to kill the insect vectors¹⁰.

In Salento, these containment measures, ordered by both local¹¹ and national¹² authorities and the European Union¹³, were met with vehement resistance from environmental activists and some olive growers. But that was not the only opposition. Surprisingly, some of the Italian media and courts accused Boscia and the other scientists who first detected *Xylella* as having caused the problem in the first place. Public prosecutors' allegations included spreading of a plant disease, misinformation, and destruction of natural beauty. The warrant order also halted the culling of infected trees and the use of insecticides.

With containment measures put on hold, inaccurate press coverage confusing the public about what actually caused the disease, and criminal charges against the very scientists who identified the problem, *Xylella* may soon spread to the rest of the country. Eventually, it could affect the entire Mediterranean basin¹⁴, which produces over 95 percent of the world's olive oil. For Italy, Spain, Greece, and other olive-oil producer countries, a widespread *Xylella* outbreak would be an economic catastrophe. But how did this situation, once detected, go so awry?

Authorities without Authority

When Boscia and his colleagues found *Xylella*'s DNA in sick trees in October 2013, they published a short note about the disease and informed the Regional Plant Health Service that the bacterium had been found in Salento¹⁵. The local authorities reported to the National Plant Health Service, which in turn alerted the European Commission. "I knew that after our communication there would have been huge consequences for farmers," Boscia told me. "The authorities were obliged to block the export of plants from the region and prevent the spread of the disease by culling infected trees."

In November 2013, the Regional Council of Apulia, of which Salento is part, approved an emergency plan. The plan included surveying the entire area for infected olive trees, removing infected plants, and spreading insecticides¹⁶.

At the same time, the European Commission asked the European Food Safety Authority (EFSA), an independent agency that provides scientific advice to the European Union, for assistance in

assessing the risks associated with *Xylella*, and recommendations for elimination strategies. The 50-page report concluded that there was no record of successful *Xylella* elimination once established in an area with a high number of susceptible plant species and insect vectors¹⁷. Therefore, strategies to contain the outbreak should focus on the “removal of infected plants [...], management of the vectors, and prevention of movement outside the outbreak area of plant hosts infected with *Xylella fastidiosa*.”

Although the EFSA report supported the emergency measures already taken by the Regional Council of Apulia, local farmers and environmental activists opposed them. Some olive growers did not want their trees to be cut down, even if infected. Environmentalists criticized the use of insecticides.

“The community was not ready from a cultural standpoint,” said Enzo Manni, head of a 600-member association of small farmers in Salento. Farmers’ knowledge is limited to what they observe in their orchards, Manni said, and to convey the urgency of the problem, the Regional Plant Health Service should have preceded any intervention with an information campaign. “Olive growers had to be aware [of the problem] if they were to accept the emergency measures,” Manni said.

Unchecked, the epidemic continued to spread. In addition to the initial outbreak near Taviano, *Xylella* was found in seven other sites tens of miles to the north¹⁸. In the meanwhile, the team of scientists working with Boscia made quick progress in their research. They identified a spittlebug abundant in Salento as the vector for *Xylella*.¹⁹ When representatives of the European Commission visited Salento, they acknowledged the important developments in research, but pointed out that containment measures had not been taken yet²⁰. The European Commission urged the regional council, which had recently seen some turnover in its top positions, to remove infected plants²¹.

But the resistance of olive growers and environmentalists remained high. “Regional authorities promised me that they would launch awareness campaigns,” Manni said. But they did not. Manni suspects that the lack of communication with the public was intentional. The newly appointed

regional governor had populist tendencies and was reluctant to make unpopular decisions. “In the institutional communication void, conspiracy theorists thrived,” Manni said.

Who’s afraid of Monsanto?

As early as May 2014, the online newspaper *Il Tacco d’Italia* (translated as, *The Heel of Italy*) began questioning whether the outbreak was real or whether it was engineered by the American multinational agribusiness Monsanto. In one article, Marilù Mastrogiovanni, the newspaper’s editor in chief, claimed a *Xylella* emergency would benefit the company, which “creates and commercializes seeds and plants resistant to *Xylella*.”

In that piece, Mastrogiovanni demonstrated the approach that would dominate her coverage of the issue. She hinted at shadowy conspiracies, highlighting the fact that Alellyx, a subsidiary of Monsanto, contained the exact same letters as *Xylella*, to insinuate that the company may have caused the crisis in the first place. She also used broad generalizations to jump to conclusions: Monsanto produces genetically-modified crops, so it must produce genetically-modified olive trees that would be sold to farmers in Salento. Eventually the *Xylella* emergency, Mastrogiovanni concluded, would be used as a Trojan horse to promote more permissive European policies regarding genetically-modified organisms (GMOs)²².

Before being acquired by Monsanto, Alellyx was a Brazilian company that sequenced the genome of *Xylella*—hence the name. Now the company develops high-yield eucalyptus, citrus, and sugar cane plants. Commercial genetically-modified olive trees do not even exist—anywhere—right now.

Mastrogiovanni’s media campaign against both the scientists and the measures ordered by the authorities earned her praise by the populist, anti-establishment Five Star Movement, which also lobbied to halt the emergency measures. Interviewed by the Movement in 2016, Mastrogiovanni boasted that, after she exposed the economic interests behind the *Xylella* emergency, public prosecutors started an investigation which resulted in criminal charges being brought against five scientists²³.

The Monsanto conspiracy theory received more attention when the Italian actress Sabina Guzzanti and Nandu Popu, frontman of a popular reggae-ska band, posted about it on social media²⁴. Guzzanti and Popu argued that the *Xylella* emergency was a hoax. The real goal, according to the duo, was to uproot one million olive trees to replace them with genetically-modified ones. “[These trees] will make us sick, because everyone knows that GMOs make [people] resistant to antibiotics,” Popu said. However, scientists agree that GMOs have nothing to do with increased resistance to antibiotics, which is due to antibiotics abuse²⁵.

The actress’ post and the singer’s video were seen by over one million people, received 19,000 “likes” and more than 55,000 shares, a high number in a country where 50 percent of people uses Facebook or Google as news and information channels²⁶. These figures are closer to 70 percent for young adults²⁷.

In the wake of her viral post, Guzzanti shared a video interview with Mastrogiovanni, who announced that she was about to publish a book to show that the *Xylella* emergency was intentional and planned²⁸.

In 2015, Mastrogiovanni self-published *Xylella Report*, “an investigative report as packed [with events] as a spy story, built in one year by putting together the clues left behind by those who planned to destroy the olive trees of Salento,” the back cover reads. In her book, which is available on Amazon and has been widely distributed in local book stores, Mastrogiovanni acknowledged Guzzanti for contributing to “reveal the deceit [...] that depicted *Xylella* as the olive trees killer²⁹.” The last chapter, written by one of Mastrogiovanni’s collaborators, even featured a picture of Guzzanti’s post, and praised her and other “opinion leaders” for popularizing the news³⁰.

However, Mastrogiovanni is reluctant to be associated with conspiracy theorists. When I asked Mastrogiovanni if she shared Guzzanti’s opinion (since her book featured the actress in two different sections), she said that she didn’t remember Guzzanti’s post. “News on social networks takes on a life on its own,” she told me. “I haven’t touched at all [the Monsanto] issue in my book.” (In fact, she discusses Monsanto more than once in her book, including in a section where

she writes that Salento should invest in local varieties of olive trees, which no multinational agribusiness will be able to replace³¹.)

Actually, Mastrogiovanni's book focused on other economic interests behind the *Xylella* emergency. According to Mastrogiovanni, the removal of olive trees would serve those who wanted to build resorts in the olive groves next to the sea³². The money allocated to carry out the emergency measures would financially benefit the Regional Forestry Resources Agency³³. Regional and national research funds would replenish the lab budgets of those scientists who first detected the bacterium³⁴. "Many people are getting rich," she wrote in 2015. "We have not been able to retrace the costs so far, but we will³⁵."

Two years later, in January 2017, I asked Mastrogiovanni who is profiting from the *Xylella* emergency. She couldn't answer. "The situation is too unstable," she told me. "I don't have the means to verify how many [construction] projects are being realized thanks to *Xylella* — instances where people remove olive trees and then build—but my gut feeling is that there are plenty." However, according to the latest available official reports, only 111 olive trees had been uprooted in the entire infected zone³⁶. If they were next to each other, these trees would cover a surface of around one acre, which roughly corresponds to the size of a football field.

Mastrogiovanni repeatedly cast doubts on the fact that *Xylella* was responsible for the olive dieback. She cited a 2010 study by Rodrigo Krugner, entomologist at the United States Department of Agriculture, who showed that the *Xylella* strains that attack North American grapevines do not provoke disease in olive trees³⁷. However, the *Xylella* strain found in Salento³⁸ is different from the ones Krugner used in his experiments³⁹. In 2015, shortly before Mastrogiovanni published her book, Argentinian scientists showed that the Central American strain, the same as the one found in Salento, was responsible for wilting olive trees in Argentina⁴⁰.

Science under Attack

While the Argentinian researchers and Mastrogiovanni were publishing the results of their investigations, Boscia's team of scientists was working hard to determine whether the bacterium

caused olive trees to die. Up to that moment there was an association between the bug and the disease—*Xylella* was detected in most instances where trees presented scorching symptoms⁴¹. But to prove that the bacterium caused the disease, it was necessary to artificially put it inside the water-conducting vessels of a healthy plant to see if the plant turned sick, a test of “pathogenicity proof⁴².”

According to the EFSA, the mere presence of *Xylella* in the European Union territory was enough for the emergency measures to be taken⁴³. But those who opposed the measures, including Mastrogiovanni⁴⁴, argued that without the pathogenicity proof there was no reason to uproot plants. Boscia and his colleagues found and published the proof in March 2016⁴⁵. Meanwhile, activists and conspiracy theorists had been given two years of visibility in newspapers and TV shows around the country.

To further argue that sick trees shouldn't be uprooted, Mastrogiovanni questioned many aspects of the science that informed the authorities' decisions⁴⁶ and suggested that the scientific community did not agree with the work done by Boscia's team⁴⁷. Her conclusions might have been different if she had contacted a leading *Xylella* expert such as Purcell, the Berkeley Professor Emeritus, or Rodrigo Almeida, Berkeley Professor in the Department of Environmental Science. “I really don't know anybody who's worked with *Xylella* for a while that is surprised by the data that's been generated,” Almeida told me. But the fact that Mastrogiovanni didn't contact Almeida wasn't an oversight. She had always been suspicious of the Berkeley researcher and his involvement in the *Xylella* emergency.

Probably the most disturbing of Mastrogiovanni's allegations is that Almeida and the scientists who first detected *Xylella* were involved in its introduction into Salento. In the late 2000s, the growing concern for a potential *Xylella* epidemic in Europe prompted a series of initiatives aimed at training plant safety scientists to prevent invasion and enforce rapid-response measures. In 2010 at the Mediterranean Agronomic Institute of Bari, more than 100 miles north of the area where *Xylella* was first detected, bacteriologists from all over the world, including Almeida, came together for a training course to spot *Xylella* disease symptoms. With the authorization of the Italian Ministry of Agriculture, bacteria and infected grapevines had been imported from

laboratories in Belgium and the Netherlands. They were used for a hands-on workshop and immediately destroyed afterward, as prescribed by plant safety regulations.

In a 2014 article in her online newspaper⁴⁸, Mastrogiovanni argued that it was suspicious that, during the 2010 workshop in Bari, Almeida said the danger of a *Xylella* outbreak in Europe was upcoming. “Visionary *eureka* moment? Could it be that *Xylella* had not been brought to Salento [with an ornamental plant] from Costa Rica, as it has been said, and that instead it has been here since 2010?” Individuals had reported this “odd coincidence” to public prosecutors, Mastrogiovanni concluded.

Mastrogiovanni’s statements were shocking, and she used them to leverage the emotions of thousands of farmers who were terrified of new technologies in agriculture. She appealed to the gut instincts of the people of Salento, proud of their heritage and identity. A sort of “Make Salento Great Again” that capitalized on popular prejudices and a generalized mistrust of science and authorities.

Fear-mongering about diabolic multinationals and other corrupt institutions is easy in a country like Italy, where almost half of 16- to 65-year-olds are functionally illiterate⁴⁹—they attended school but are unable to engage in activities requiring writing and reading skills beyond a basic level. These people struggle to understand a medicine label, fill out a job application, or read a newspaper article that contains more than one simple piece of information.

People who are functionally illiterate are easy prey for bogus news. But when there is no scientific authority to speak out against inaccurate science communication, even the most critical readers have a hard time figuring out what is true and what isn’t. In many countries, scientific agencies often communicate on science matters that impact society. For example, in the U.S., the American Medical Association⁵⁰, the American Association for the Advancement of Science⁵¹, and the National Academy of Sciences⁵² have declared on many occasions that there is no evidence that GMOs are unsafe. And in 2014, the U.S. National Academy of Sciences and the U.K. Royal Society jointly published a readable report on the causes of global warming⁵³.

Unlike their American and British counterparts, Italy's National Academy of Sciences, scientific agencies, and universities usually refrain from taking a stance on societal issues. The Italian academic system is crippled by a lack of meritocracy and transparency, and scientific agencies are often headed by political trustees. Between 2011 and 2016, the National Research Council (CNR), Italy's largest multidisciplinary research institution, was led by Francesco Profumo, secretary of education of the Monti cabinet—Italy's provisional government from 2011 to 2013, and then by Luigi Nicolais, member of the Italian Democratic Party⁵⁴. Add to that the limited research funding—Italy invests only 1.3 percent of its gross domestic product in research, compared to U.S.' 2.8 percent⁵⁵. Conflicts of interests are likely to arise. If a scientist is funded by the regional government to, say, study local tomato varieties, she might lose her funding if she advocates for GMOs.

But there's more. While most American universities have public outreach programs and some even offer year-long fellowships for science journalists to strengthen their professional skills⁵⁶, Italian universities are traditionally reluctant to communicate with the broader public. A recent survey showed that 57 percent of the CNR outreach initiatives were aimed at the announcement of research results and only five percent of initiatives were focused on the active involvement of the public. CNR's preferred mode of communicating science is through conferences and workshops aimed at a specialized public; only 14 percent of meetings are addressed to the general public⁵⁷. Like scientific research, institutional science communication also suffers from lack of funding and widespread cronyism. Recently, the University of Bari appointed a 78-year-old former deputy mayor as consultant to the press office⁵⁸.

Even as a handful of universities establish courses to train science communicators, there isn't a single Italian university that has a dedicated department or offers a tenured professorship for science communication⁵⁹. Academics do not want to share the scant funding pie with others. Although scientific agencies and universities publicly wish for better science education and communication⁶⁰, their internal mantra seems to be “hear no evil, see no evil, speak no evil.” And they stayed true to it during the *Xylella* emergency.

When Lady Justice is Blind to Facts

In May 2014, after individuals told police that they suspected *Xylella* had been brought into Salento during the 2010 workshop, judge Cataldo Motta ordered public prosecutors to seize Boscia's and his colleagues' computers and lab notebooks. By December of the next year, ten people, including Boscia and other four scientists, were put under investigation. Accusations included spreading of a plant disease and destruction of natural beauty. Prosecutors in the Lecce court referred to many of the allegations that had been made by those who were against the removal of plants, including Mastrogiovanni. The scientists were accused of misinforming the authorities about the risks of a *Xylella* outbreak because it had not yet been proven that it was the bacterium that caused the olive decline.

According to prosecutors, various subjects might have had economic interests in announcing an emergency. They noted that Monsanto, "which in 2008 acquired the company Alellyx (word scramble of *Xylella*...)," [sic] sponsored a 2013 meeting organized by Boscia and colleagues to discuss the rapid olive decline. The warrant did not offer any evidence of how this was related to the outbreak, though.

Finally, the prosecutors insinuated that *Xylella* might have been spread during the 2010 workshop in Bari, when bacteria and infected plants had been introduced into the Mediterranean Agronomic Institute. It did not seem to matter that the institute is over 100 miles north of the infected zone and that the strain found in Salento is different from the ones used during the workshop. The fact that scientists were concerned about a *Xylella* outbreak in Europe at that time was "rather anomalous," the prosecutors affirmed.

The warrant issued by the Lecce court halted all containment measures. To justify their decision, the prosecutors quoted Purcell, the Berkeley Professor Emeritus who, according to *VideoAndria*, a local online newspaper, said, "don't make the same mistake we made [in California]: uprooting trees is useless against *Xylella*."

The problem is, Purcell never said those words. In December 2015, he was at an EFSA meeting to discuss the risks associated with *Xylella*. After his talk, Purcell was approached by Rosa

D'Amato, a Five Star Movement representative at the European Union congress. "She asked, 'don't you think removing olive trees is a waste of effort?' I said, 'no, just the opposite,'" Purcell told me. "I tried to argue very forcefully to convince her why this was so." D'Amato then gave an interview to *VideoAndria*, saying that Purcell had stated that uprooting plants was useless⁶¹. "This is not a 'I said-she said' sort of situation, it's not that only the two of us know what we've said, because there is a video of my talk and you can go online and check what I've said," Purcell told me. But the journalist who interviewed D'Amato did not check the facts nor ask Purcell about the statement. And that fake piece of news spread until it arrived to the Lecce prosecutors, who sentenced Salento to ruin.

"Is it There, or Not?"

With such a widespread confusion, it is not surprising that almost four years after the first announcement of the outbreak, when people in Salento bump into someone who is reporting on the case, they ask, "this *Xylella*, is it there, or not?"

At the national level, public understanding is even more chaotic. "With some exceptions, national media did not cover the news, so most of the available information was coming from conspiracy theorists," said Beatrice Mautino, freelance science journalist who reported frequently on the outbreak for the Italian issue of *Scientific American*.

The lack of specialized reporters might have contributed to the scattered press coverage of the *Xylella* emergency. In the last ten years, economic hardship and the rise of the web have crippled Italian print media. Circulation of the two most popular newspapers, *Corriere della Sera* and *La Repubblica*, has dropped by over 40 percent⁶². This decline forced many newsrooms to lay off reporters, especially those as specialized as science journalists⁶³. Most Italian newspapers no longer have science desks and often rely on generalist reporters to cover science-related issues. In many instances, the *Xylella* epidemic was reported as political news, framing two opposing views. On one side, the scientists. On the other, the conspiracy theorists⁶⁴.

Conspiracy theories aside, media simply circulated inaccurate information. *Le Iene*, a popular prime time TV show, aired a series of video reports to argue that infected trees should not be

removed because a cure for the disease had already been developed⁶⁵. In reality, a biologist named Antonia Carlucci, Professor of Plant Pathology at the University of Foggia, is testing different commercial products against *Xylella*. So far, treating trees with these products improves the symptoms, but none has been shown to eliminate the disease, akin to what a cup of hot tea does for someone in bed with a bad cold⁶⁶. “I’d like to make clear that we still need to find the product that can inhibit bacterial growth,” said Carlucci, who disapproves of journalists misrepresenting her results. “I often receive phone calls from farmers asking for the miracle cure,” she said to me. “I tell them that there is no miracle cure, this is not what we are working on.”

Local newspapers talked about “enriched” water—a water with “therapeutic” effects, developed by a homeopath who allegedly cured twenty trees affected by *Xylella*⁶⁷. Neither the protocol to confer “therapeutic properties” to ordinary water nor the results of these experiments have been reviewed by experts or published in a scientific journal.

In this chorus of conflicting voices, conspiracy theories, unverified data, and inaccurate information, *Xylella* is the only winner. Now the entirety of Salento, with its 11 million olive trees, is considered a hopeless territory from which the bacterium cannot be eliminated⁶⁸. Ten million trees have been infected so far, causing losses of over one billion dollars⁶⁹. In 2016, the production of olive oil in the infected areas decreased by almost 30 percent, and experts forecast a 60 percent drop for the next harvesting season⁷⁰.

Driving around Salento is like wandering in a boundless graveyard. As a farmer said to me: “This used to be an earthly paradise, now it looks like the kingdom of the dead.” Stretches of olive orchards, once vibrant green brush strokes on the reddish clay-rich soil, now resemble armies of headless zombies—their dense canopies reduced to a few bare, pale-brown branches projecting into the sky.

However, there is still hope that the disease won’t spread to the rest of Italy, and possibly the Mediterranean basin. The geography of the Salento peninsula lends itself to a containment strategy. The infested area is surrounded by sea and connected to the rest of the country only

through its northernmost part. The European Union requested that regional authorities create a 12 miles-wide zone between the mainland and the infected peninsula. This zone would be continuously monitored to be kept free of *Xylella*. Infected trees would be uprooted, together with any plant within 300 feet—the distance that an insect vector can travel⁷¹.

“Cutting trees is just one part of a complex approach,” Purcell said. “The public has to cooperate in reporting new infections and allowing culling.” In order for this to happen, Purcell suggests a massive information program that would make citizens, particularly farmers, aware. But authorities are still not making any effort to communicate the risks associated with *Xylella*—nor the latest advances in scientific research on the topic—to the local communities.

Science, Politics, and the Media

“There’s a huge communication void that is filled up with chatter,” said Giorgio Morelli, researcher at the National Research Institute for Food and Nutrition and member of the Accademia dei Lincei, the Italian National Academy of Sciences. The academy has traditionally been hesitant to speak up about issues of science in society. As far back as the early 2000s, the members of the academy produced a document about GMOs, but in the end it was only signed by individual scientists and not the academy, because the issue had huge economic implications.

In 2016, however, the academy published a report in which they summarized the key scientific aspects of the *Xylella* emergency⁷². “We rebutted all the points [public prosecutors] raised, which were the same as those presented in Mastrogiovanni’s book,” Morelli said.

But getting the academy’s points across is far from trivial in a country where half of the adult population reads at a fifth-grade level and at a time when the most popular news channels are Google and social networks, where the most shared rather than the most reliable information has the most visibility.

Information about the *Xylella* emergency has been conveyed almost entirely on the web, often through user-generated content. From Mastrogiovanni’s online newspaper to activists’ blogs and social media pages, a deluge of news, most of which is inaccurate and some utterly false, has

flooded Italian homes. A debunking blog, *Bufale Un Tanto Al Chilo* (BUTAC), demystified bogus news such as the Monsanto conspiracy. However, fueled by a widespread ignorance of scientific matters and a generalized mistrust of scientists, conspiracy rumors created the perfect storm that brought thousands to the streets in protest against the containment measures⁷³. “Social media such as Facebook are molded to their users’ tastes,” said Neil Perri, author of several posts about the *Xylella* situation for BUTAC. “So, those who thought there was a conspiracy against Salento were exposed to news that suited their opinion.”

We live in an era when scientific evidence—from vaccine safety to global warming—is questioned. Today, the ramblings of any Twitter user can reach as broad an audience as the informed statements of an expert. So it’s crucial that the media are able to distinguish facts from fiction before communicating with the public. Complex issues such as science deserve particular attention. News outlets should be wary of unfounded opinions and should avoid presenting hard facts as just one of the many available options. Solid scientific evidence cannot be negotiated.

The *Xylella* case is not the first example of questionable news influencing the decisions of public officials. The Italian government itself has been fooled by a blatant case of pseudo-science supported by some media. In 2013, the parliament sponsored a \$4-million clinical trial for a rogue stem-cell therapy, and Italy’s national health services paid for the therapy to be administered to patients⁷⁴. A pressing media campaign in favor of the treatment outplayed the concerns voiced by prominent scientists. “We learned to avoid appearing on television shows on which cool reason is drowned out by strong emotional messages,” one of the scientists opposing the therapy wrote in *Nature*⁷⁵.

“Italy lacks an immune system against pseudo-science,” said Luciano Beneduce, Assistant Professor of Microbiology at the University of Foggia, who advocates for more effective science communication. Creating such an immune system means that the media should not only provide the public with accurate information about scientific findings. They should also communicate how science is done: its challenges, its complexity, its limits. Science often does not provide the immediate answers that the public wants, and those who communicate science or report about it should be cautious as well.

Sensationalist headlines are as detrimental to science as the reporter who accuses researchers of colluding with Monsanto to kill Salento's olive trees. Scientific research is a continuous process and, as such, it advances through small, incremental steps. Sometimes scientific evidence can be incomplete, which does not make it wrong or unreliable; it just means that the process of discovery has not been yet concluded. Sometimes, evidence could be even contrasting with previous data, and scientists have to reconcile apparent discrepancies.

How can science journalists help the public grasp all the nuances of the discovery process? How can communicators bring the average Italian household closer to the realities of science? Should journalists do independent research before communicating science to a lay audience? Journalists certainly need to talk to enough scientists to get the story right. And they should refrain from committing to one cause regardless of the experimental evidence that supports it. "We need professionals," Beneduce said. "It's not possible to improvise."

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Salento's Gold

It's a windy afternoon in December 2016 and Giovanni Melcarne fidgets around his olive grove, taking one phone call after the other as he coordinates interviews with journalists and local meetings about the *Xylella* emergency. A 47-year-old agronomist and olive oil producer, Melcarne sports a buzz cut and glasses with blue frames. He speaks with a loud voice, punctuating each sentence with sweeping movements.

Melcarne thinks that public officials who have supported "pseudo-environmentalists and conspiracy theorists" are responsible for the spread of the bacterium. "*Xylella* found a fertile ground on which to develop," he says. "Italy's anti-science faction is still living in the dark ages." As a response to the inactivity of the authorities, Melcarne decided to make all his plants available to Boscia's team of researchers to try to help save Salento's gold.

Boscia's team recently reported that some varieties of olive trees, for example those cultivated in Tuscany, show milder symptoms than local varieties⁷⁶. Researchers are now grafting Melcarne's olive trees—all infected with *Xylella*—with over 250 other different varieties to test if any of them will show tolerance or even immunity to the bacterium⁷⁷. If the researchers find varieties that are able to survive the infection, olive growers in Salento could graft those types onto sick centuries-old plants and rescue them. Melcarne funded these tests with 30,000 euro (around \$33,000) from his pocket to speed up the search.

“To solve this problem, one needs initiative,” Melcarne says, while rummaging in his pockets for his car key. A few minutes later, he is speeding away—phone in one hand, steering wheel in the other—towards another orchard where he is testing other promising olive varieties. If the efforts to contain *Xylella* north of the infected zone fail, the devastation will spread to the more than 50 million olive trees of Apulia, of which Salento is the southernmost tip. Immune varieties might give hope to thousands of olive growers who now risk losing everything. This hope rests on the initiative of a restless olive grower and a handful of renegade scientists.

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- ⁶⁴ One example of this type of reporting is the following article published by the popular newspaper *La Stampa* (article in Italian): <http://www.lastampa.it/2016/10/09/italia/cronache/la-guerra-degli-ulivi-xylella-una-manna-per-le-lobby-dello-olio-kwuyB1itKLTjFGgDwTxLPN/pagina.html>
- ⁶⁵ http://www.iene.mediaset.it/puntate/2015/11/09/toffa-curiamo-gli-ulivi-del-salento_9746.shtml; <http://www.iene.mediaset.it/puntate/2016/02/14/toffa-si-vogliono-davvero-salvare-gli-ulivi-del-salento-9967.shtml>
- ⁶⁶ “The treatments under consideration may reduce the symptoms of *X. fastidiosa* in olive trees, but do not eliminate the pathogen *X. fastidiosa* from the treated infected plants.” European Food Safety Authority (EFSA). (2016). Treatment solutions to cure *Xylella fastidiosa* diseased plants, *EFSA Journal* 14(April). <https://doi.org/10.2903/j.efsa.2016.4456>
- ⁶⁷ <http://salvatoreraino.com/lacqua-informatizzata-funziona/>
- ⁶⁸ “In the province of Lecce, the specified organism is already widely established. Where evidence shows that in certain parts of that area the specified organism has been present for more than 2 years and it is no longer possible to eradicate it, the responsible official body should have the possibility to apply containment measures, instead of eradication measures, to protect at least production sites, plants with

particular cultural, social or scientific value, as well as the border with the rest of the Union territory. The containment measures should aim to minimise the amount of bacterial inoculum in that area and keep the vector population at the lowest level possible.” European Commission. Commission Implementing Decision (EU) 2015/789 of 18 May 2015 as regards measures to prevent the introduction into and the spread within the Union of *Xylella fastidiosa* (Wells et al.). *Official Journal of the European Union*, L 125-36.

⁶⁹ <http://www.lagazzettadelmezzogiorno.it/news/home/875141/coldiretti-puglia-i-danni-da-xylella-superano-il-miliardo.html>

⁷⁰ <http://www.lagazzettadelmezzogiorno.it/news/home/876518/xylella-coldiretti-puglia-stima-crollo-produzione-olio-del-60.html>

⁷¹ European Commission. Commission Implementing Decision (EU) 2016/764 of 12 May 2016 amending Commission Implementing Decision (EU) 2015/789 as regards measures to prevent the introduction into and the spread within the Union of *Xylella fastidiosa* (Wells et al.), *Official Journal of the European Union*, L 126-77.

⁷² Accademia dei Lincei. (2016). Rapporto *Xylella*.
http://www.lincci.it/files/documenti/Rapporto_xylella_20160622.pdf

⁷³ <http://www.lagazzettadelmezzogiorno.it/news/home/639366/xylella-in-4mila-in-piazza-a-lecce-salviamo-gli-ulivi-lunedì-incontro-a-bari-a-lecce-primo-progetto-ricerca-artisti-in-campo-difendiamo-gli-ulivi.html>

⁷⁴ <http://www.nature.com/news/italian-stem-cell-trial-based-on-flawed-data-1.13329>

⁷⁵ Cattaneo, E., & Corbellini, G. (2014). Stem cells: Taking a stand against pseudoscience. *Nature* 510, 333-335. <https://doi.org/10.1038/510333a>

⁷⁶ “The data developed under controlled conditions and artificial inoculations support the preliminary field observations picturing that some cultivar, i.e. Leccino, although infected by the bacterium develop only mild symptoms and support a lower bacteria concentration than the trees of Cellina di Nardò.” Saponari, M., Boscia, D., Altamura, G., Attoma, G. D., Cavalieri, V., Zicca, S., ... Fumarola, G. (2016). Pilot project on *Xylella fastidiosa* to reduce risk assessment uncertainties Institute for Sustainable Plant Protection, External Scientific Report, *EFSA Supporting publication*.
<https://doi.org/10.2903/sp.efsa.2016.EN-1013>

⁷⁷ http://bari.repubblica.it/cronaca/2016/09/24/news/xylella_al_via_in_salento_i_test_di_tolleranza_il_progetto_su_1_000_ulivi_nelle_campagne_di_presicce-148441472/?ref=twhr×tamp=1474731544000&utm_source=dlvr.it&utm_medium=twitter