

*The Tropical Race 4 strain (TR4) of Fusarium oxysporum which causes Panama disease in Cavendish bananas has been found in a Pakistani plantation and a Lebanese farm in two more separate outbreaks. At [www.freshfruitportal.com](http://www.freshfruitportal.com), we caught up with Wageningen University & Research Centre lead researcher Gert Kema who discussed implications for the Indian subcontinent as the disease's spread continues.*

Kema became involved after reading an online forum post made by banana grower Hadi Bux Laghari from Asim Agriculture Farm in Pakistan, who was suspicious some of his plants were showing signs of the deadly fungus. 

"I immediately responded to him and asked him if he could cut one of the plants to see how it looks internally, so that's what he did and he said that he was almost sure that it's Panama disease," Kema told [www.freshfruitportal.com](http://www.freshfruitportal.com).

"I asked him to document everything, take photographs and send the samples to me which he did. We looked into the material once we received it here and we carried out DNA tests and various other tests, isolated the fungus and infected healthy banana plants and eventually we confirmed that it was indeed TR4."

Initially the infected area in Pakistan was just six hectares; Kema now believes that has increased to more than 100 hectares.

Simultaneously, he was analyzing suspected Panama disease plant specimens sent from another plantation in Lebanon, after concerned growers also suspicious of the disease and posted samples to the Dutch lab.

"Once again the diagnosis was TR4. The acreage in Pakistan is a few hundred hectares whereas in Lebanon it's very limited with just a few hectares. These are two new incursions in Pakistan and Lebanon and come very quickly after what happened in Queensland, Australia a little while ago and in Jordan and Mozambique last year.

"We are almost sure that it arrived in Lebanon via a man from Jordan transporting infected plants as TR4 was already reported in Jordan but as far as Pakistan is concerned, we don't have the slightest idea how it got there."

### **What are the next steps?**

Kema plans to visit the Lebanon plantation over the coming months but is concerned that 'communication difficulties' in Pakistan may hamper his recommendations.

"Frankly speaking the communication is pretty difficult with Pakistan so I'm afraid I don't yet have a good idea of how they are currently handling it, although of course we have recommended for them to take immediate action in terms of isolation and quarantine.

"The first thing to do of course is to isolate, not only those contaminated plants, but any other plants that show symptoms as well as surrounding plants, and quarantine all of them.

"I have never been to Pakistan and I don't know yet whether they will be following these recommendations or not. At present all we can do is offer our advice and recommendations on what should be done now. I am happy to buy a ticket and just fly out there but communication has been very difficult so far."

Although both of the latest outbreaks are of major concern and demonstrate TR4 has global implications, Kema believes the Pakistan outbreak is very significant because of its close proximity to India, a global leader in banana production.

"These are both significant but particularly so in Pakistan because the plantation there has a substantial area of bananas and they grow in an area that is frequently flooded which is one way to spread the disease.

"Without dramatizing the situation, India is a major banana producer in the world and to have Panama disease next door shows there is definitely a risk and so having this strain in the Indian sub continent is definitely not a good thing.

"This is just another sign that shows the issue of Panama disease is becoming more and more serious with TR4 popping up in different countries which is a huge alert for quarantine action to be taken as well as awareness campaigns. I really hope that maybe officers from the Food and Agriculture Organization (FAO) or others can get in touch with the growers in Pakistan and see how they can effectively quarantine."

### **How was TR4 transported?**

This question still remains unclear but it's an important one for Kema who suggests several theories.

"People can take this along with them as it were, although we don't know in exactly what form, particularly in Pakistan's case but we do know that it spreads very quickly. It could be through infected plants, perhaps someone smuggled plants or they carry contaminated tools or wear contaminated shoes.

"We are generating a lot of new information in general terms regarding Panama disease, some of which I cannot disclose yet, but there are still very many questions we need to find answers for."

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