

Date: Thu, 15 Sep 2005 05:40:40 -0700  
To: chaondo@ybb.ne.jp  
From: Ignacio Chapela <ichapela@nature.berkeley.edu>  
Subject: Defensins - indefensible in GMOs  
Cc: ngin@gmwatch.org, akiko@nordic.grenpeace.org,jcummins

Dear Dr Kanagawa,

Akiko Fried has brought to my attention your open letter of concern regarding the planting of defensin-producing rice in Japan. I am writing to express my wholehearted support to your letter, and also to see if we could establish some measure of communication that would allow us to go deeper with the critique that you rightly opened.

I have taken some time to write to you because I wanted to do some research on the defensins to try and be more useful than simply a source of moral support. I imagine that you are quite isolated in your position, since so many of our colleagues find it difficult to say what they know, for fear of jeopardizing their funding or connections. So, first of all, please let me applaud you and your courage in saying what you understand, for the benefit of the public. I also want to extend my interest in providing support in any way you feel I can in order for your voice to be heard, because I believe your message is very important for the world.

I have not done enough research yet, but it does not take long to see that even the idea of conceiving rice with high expression levels of defensins is nothing short of insane or criminally perverse. You point out a very important consideration, namely that very basic rules of biology dictate that sooner or later - and probably sooner than later, resistance in the HIV virus will emerge, at which point we will have at least two problems where before we only had one: HIV and the defensin-producing rice itself.

It seems to me, however, that there are also several other reasons which should have stopped anyone with the idea of defensin-producing rice from actually doing so. I was astounded to hear from you that rice has indeed been put in the ground which over-expresses a defensin. The other arguments that I immediately find are, quite briefly, as follows - please do not take these as the result of deep research, since I have not had enough time to do that:

- Defensins are a very loosely-defined group of peptides which are named by one of their apparent functions. We really do not know what they do in their normal physiological environment, in humans or in plants, in the ecosystem and in the human environment.

- With the production of a peptide, the risk of generating immunological responses in humans is practically assured, and these could range well into the allergic reaction level. I doubt that the producers of this rice have looked properly into this problem.
- Transgenic manipulation of plants can result in radical changes in the outcrossing behaviour of the plant. I doubt that the producers of this rice have checked for the movement of the DNA that they introduced into the plants beyond their fields. They have probably not considered the remnants of volunteer seed that is left behind, unavoidably, after harvest.
- Another function of defensins is contraception (! see review attached below). What the producers of this rice might be introducing into the public environment could well become an unintended sterilization campaign through the most important staple food in the world!
- There is a whole series of problems associated with transgenic plants which have been discussed against much opposition in the US, Europe, Australia, etc. All these concerns apply equally to these defensin-producing rice.

So to summarize, I find even the proposal of defensin-producing rice a highly dangerous proposition, but the planting of such organisms in the environment reaching into the criminal. I do hope that Japan's authorities have the clarity of mind and the will to put a stop to this experiment, and also to establish clear boundaries to those who believe, as you say, that they have the right to introduce anything they want into the public open environment.

I think that a good analysis of this proposal could be written and should be published in the scientific literature. Maybe we should think of a collaboration in this regard?

Once again, many thanks for what you are doing to expose this unbelievable abuse, and receive my best wishes,

sincerely,

Ignacio Chapela

Eur J Contracept Reprod Health Care. 2005 Mar;10(1):32-42.

Related Articles, Links

Antimicrobial peptides as microbicidal contraceptives: prophecies for prophylactics--a mini review.

Yedery RD, Reddy KV.

Immunology Division, National Institute for Research in Reproductive Health, Mumbai, India.

The global increase in human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) and sexually transmitted infections (STIs) has led to the introduction of barrier methods, such as condoms. However, drawbacks associated with condoms, such as men being reluctant to use them and women being unable to negotiate their use, have led to the search for better and acceptable alternatives, namely the microbicides. These are gel formulations that, when used prior to sexual intercourse, protect against the transmission of HIV and other STIs. However, after observing the side-effects of nonoxynol-9, a component of the microbicidal formulations available on the market, the focus has shifted to natural available compounds demonstrating the preferred protective effects. Antimicrobial peptides (AMPs) are one such group of compounds present in a wide range of organisms from bacteria to humans. The existing 750 or so, low-molecular-weight, cationic charged peptides are classified into five major groups based on their three-dimensional structure obtained by nuclear magnetic resonance studies. The hypothesized mode of action seems to be the interaction of the positively charged peptides with the negatively charged phospholipids present on the surface of the cell membrane. Various studies have demonstrated the effect of several AMPs, namely, defensins, protegrins, cathelicidins, cecropins, polyphemusins, magainins and melittins, against various STI-causing pathogens and HIV/herpes simplex virus, both in vitro and in vivo. The contraceptive efficacies of magainin and nisin in vitro and in vivo are worth mentioning. We believe these peptides are suitable candidates in the development of newer mechanism-based microbicides in future.

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