

The wheat rust crisis in world agriculture



Jim H. Adams

www.jimhadams.com

Foreword

This compilation of sources describes the science, history and action which is being taken to contain the epidemic of stem wheat rust that is threatening world agriculture, and its surrounding conceptual, economic and social foundations. It is part of research specified by Graham Ennis for his book on climate catastrophe. Whereas the overall layout of themes is my own, locally it is not independent thinking, except where I compare one theme with another. References are given, together with the Google searches which at the time of writing locate them. These may be found for instance by the search “wheat rust”, and should be referred to for more up-to-date information.

I am not an academic expert, and such a wide-ranging study could rightly be subject to criticism. Even so, the range is not wide enough. The study limits itself to those aspects directly linked to food and agriculture, and depicts an instability in the world system as if the global environment were almost stable. Although we touch on issues of food-miles and the nature of the global economic system, particularly for agribusiness, other issues linked with global and local features of contemporary industrialised society mainly situated in the North, in particular emissions of the greenhouse gas carbon dioxide into the atmosphere causing global heating, will impact catastrophically on world agriculture, so this is a relevant issue of supreme importance, which cannot be separated from a good description of the path of our actions needed to handle the world food crisis.

Thus this investigation is only one part of what has, is and ought to be done, and other works will continue the need to address these issues. Global heating and its results will become the main concern as time moves on.

Within the specifics of this study, I have found two dialogues inherent in what is being done on wheat rust. The easiest to reach on the internet is the widespread scientific agreement on its causation. This is linked in the scientific community to issues of control and eradication, most specifically by genetic modification of wheat, as part of a world programme.

Opposing these trends, many indicate the gross inequalities between the industrialised North and the poor South, the stealthy intrusion of powerful Northern agribusiness, for example Monsanto, in policy and lock-in for the development of food production in Southern regions, without due regard for safety or the interests of other than a small group of Northern investors intimately linked mainly to US government and policy. Ideas of permaculture and organic farming are related to this viewpoint, as a rational alternative to industrialised high-energy, wasteful and inefficient agriculture and the dominance of multinational corporations.

In order to address these divergent concerns, I am using at the world level the ideas of Jürgen Habermas on deliberative democracy, which states that, for a democratic decision to be legitimate authentic deliberation must come before it – deliberation among decision-makers that is free from distortions of unequal political power, such as power a decision-maker obtained through economic wealth or the support of interest groups. If the decision-makers cannot reach consensus after authentically deliberating on a proposal, then they vote on the proposal using a form of majority rule.

To do this, even in the absence, by and large, of public discussion in which such decisions are made, I identify the authority structures of world food production. In the North these have access to capital, both institutional and of the global rule by the wealthy, and to science-based information. I itemise some of the features of this global elite, corporate and governmental,

and ask whether their behaviour corresponds to welfare capitalism or aggressive self-interest. In the poor and populous South, I identify the farming communities, the levels of education and the meagre substitutes to social security which determine behaviour.

Professor James Fishkin, who has designed practical deliberative democracy tools for over 15 years in various countries, describes five characteristics essential for legitimate deliberation:

- *Information*: Accurate and relevant data is made available to all participants.
- *Substantive balance*: Different positions are compared based on their supporting evidence.
- *Diversity*: All major positions relevant to the matter at hand and held by the public are considered.
- *Conscientiousness*: Participants sincerely weigh all arguments.
- *Equal consideration*: Views are weighed based on evidence, not on who is advocating a particular view.

The problem is then to identify the above criteria in the case of wheat rusts, as a typical example. In the limited time available, I have used internet searches critically, sometimes described as ‘an important source of misinformation’, put together opinion, and tried as best I can to provide the basis for starting an informed debate.

Jim H. Adams

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Summary

A crop-killing fungus is spreading out of Africa towards the world's great wheat-growing areas. We put forward the argument that this wheat rust crisis in world agriculture is a typical example of other crises in the world food system. We describe some of the ways which have been developed to deal with this crisis, and other parts of the same system which have led to the crisis in the first place. A part of our thesis is that these systems of management and control are not responsible for all factors present in world food production, many of which are strongly autonomous and outside the political, scientific-technical and economic systems of governance currently operating.

To this end, we sketch aspects of the system at the world level of food production and distribution, and the organizations which support it, in particular the Food and Agriculture Organization of the United Nations (FAO), the ownership of agribusiness, the Monsanto Company, summarize the market trading system in wheat as part of North-South power relationships and describe farming in the South, as well as pointing out our interest in organic farming and permaculture, which are poor relations in this world system, and compare all of these observations with what is happening to total world population and food.

The wheat rust we then describe may be subdivided into three types: yellow rust of wheat, also known as stripe rust, mainly found in wheat grown in cooler environments, stem wheat rust, and wheat leaf rust.

Wheat rust diseases are a global concern. Stem, yellow and leaf rust are the most important diseases of wheat occurring in almost all wheat growing countries. Wheat rusts, like other pathogens, over time can evolve into new strains that are more virulent and damaging to wheat crops. *Ug99* is one such strain of stem rust, which emerged in Uganda in 1999. It has since spread beyond East Africa as far as Iran. The major concern is that majority of the wheat varieties across East Africa, West and South Asia is susceptible to this virulent strain or its derivatives. Similarly the *Yr27* virulent strain of yellow rust has caused significant losses in some countries in North Africa, the Near East and Central and South Asia during the serious epidemics in 2009, 2010 and 2013 showing that there is no room for complacency and a continuous fight is necessary.

Overall, stem wheat rust is a really big problem that we must find a solution to before it is too late. If we do not find a solution to stop the expansion of *Puccinia graminis*, or at least slow down its expansion, one of the largest producers of wheat will be destroyed (Singh et al., 2008). It has been estimated that around 85% of the global population require wheat as one of their only calorie source, it has also been estimated 60% depend on it as their protein source, with that number increasing to 82% if we take into account the countries that use wheat as their second or third ranking source of protein (2008).

With such a large number of people depending on the global production of wheat, we cannot allow one of the largest producers of wheat to get hit by the *Ug99* epidemic without being prepared. There are many different ways to prevent the expansion of stem wheat rust, including the eradication of barberry, the use of fungicides, and the use of genetic manipulation to create wheat stains that are resistant against *Ug99* as well as other races. The eradication of barberry is not enough as it was proven in North America, and the use of fungicides has proven to be too expensive (Schumann and Leonard, 2000). With most other

types of control not being good enough to stop the spread of *Ug99*, it seems that the only way to combat the spread of stem wheat rust seems to be genetic engineering (Singh et al., 2011).

Studies have been made since 2005, by having gene transfer from species related to wheat into the wheat genome. So far there are promising results that can give us hope to stop the expansion since multiple variations of genes resistant to *Ug99* and other races have been found (Singh et al., 2011). Not only are the results encouraging, but the fact that different countries, international organizations, private seed companies, and farmers have been cooperating gives hope that with enough work and cooperation, the goal of avoiding a food production catastrophe could be achieved (2011).