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Due to Sex Change, European Potatoes Increasingly Dependent on Fungicides

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From the 1890s through the 1940s, European potato farmers sprayed copper fungicides for late blight control. In the 1950s, synthetic chemical fungicides (the EBDCs) were introduced and largely supplanted the use of copper because of their greater crop safety.

The copper and EBDC fungicides are protective against late blight infections. These fungicides work by covering foliage so that when late blight spores land, they are prevented from entering the plant. In the 1970s, fungicides of a curative nature were introduced. These fungicides can eradicate an established infection with systemic action.

Sexual reproduction by mating types A1 and A2

Surveys have indicated that 95-99% of the potato acreage in Germany, France, Belgium, Netherlands and the UK are treated annually with fungicides. Long-term research (1943-1982) demonstrated that, on average, fungicides increased potato yields in Europe by 20-25% [1]. As a result of the use of effective fungicides, late blight infections were not a major concern in Europe until the early 1990s.

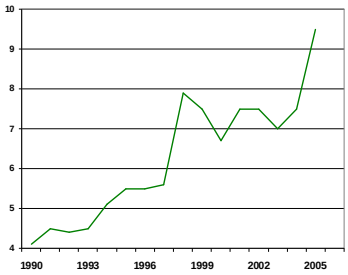

Figure 1: Fungicide Use in Potato, Denmark, by Number of Treatments

Introduction of exotic strains of late blight fungus caused a reemergence of the disease [2]. Up until the 1980s, the fungus in Europe consisted of only one kind—the A1 mating type, and only asexual reproduction was possible. The A1 type is short-lived and can only exist on a living potato family host such as vines, foliage, and tubers. In the 1980s, a second mating type (A2) immigrated to Europe. Sexual mating between A1 and A2 types produce a tougher spore with a thicker protective cell wall more able to survive freezing temperatures and exist outside a living host in the soil. The new strains are more aggressive than the traditional strains and produce more spores. They have a faster lesion expansion rate and complete their disease cycle in fewer days resulting in more cycles of infection. As a result, the new strains require more fungicide applications (25% more) for adequate suppression of late blight symptoms than were previously required. Growers need to spray every 2-3 days instead of every 4-5 days.

Treated Untreated

Late blight fungicide

As a result of the spread of A2, European farmers have intensified fungicide use in the last fifteen years. For example, in Denmark the number of fungicide applications in potatoes has doubled (Figure 1). In 2008, the average number of fungicide sprays for late blight control in potatoes was estimated at: Germany, 7; England, 11; Belgium, 15; The Netherlands, 13; Denmark, 9; and France, 15 [3]. It has recently been estimated that without the use of fungicides 45% of the potatoes planted in the UK would be lost primarily to late blight [4].

References

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