

Interview with Professor Robbie Waugh on potato genetics

Interviewer: How big an impact has our growing knowledge of genetics had on the general revolution that's been in plant science over the last 20 to 30 years?

Professor Robbie Waugh: The revolution really started with our ability to follow the segregation of, or inheritance of, regions of plant chromosomes when we make crosses between two parents and then these chromosomes segregate in the progeny and because we can follow the inheritance of these segments of chromosomes, the chromosomes contain genes and some of the versions of these genes are good and some of them are less good. So if we can follow the better versions of these genes in progenies we can select for better versions in a breeding process so we can select from more resistant plants or higher yielding plants based on our ability to follow these segments in the lab. So in plant science the outcome has largely been the identification of genes that control these phenotypes or these traits, we call them phenotypes. That's led to an understanding of what makes a plant have six rows of grain rather than two rows of grain, whether it flowers early or late, whether it's of dwarf stature or a tall stature and we are trying constantly to understand, or improve our understanding, of the molecular processes that result in that phenotype or that trait.

Interviewer: What has that meant for controlling pests and diseases in plants like the potato and cereal crops?

Professor Robbie Waugh: In terms of some crop plants I think potato will be a good example of this; the impact will come in our ability to make genetically modified potatoes and the reason for that specifically in potatoes is because it's actually a very difficult crop to breed. So, there are two major outcomes – one I think is the ability of breeders to follow chromosomal segments in their crossing programmes, they do that in the lab which is a bit more efficient and certainly cheaper but also on the horizon, I guess, the ability to introduce new traits into crops that are difficult to improve, like the potato.

Interviewer: Specifically though for the potato what has mapping the potato genome actually meant?

Professor Robbie Waugh: It will provide initially scientists with the tools and the knowledge to identify genes that control traits. Now, what do I mean by a trait? I mean a gene that will make a potato either more resistant to a pathogen or make it's texture more amenable to either deep frying or making mashed potatoes or make it tolerant to less water as climate changes might make it tolerant to less water and still yield the same amount. The thing that's closest on the horizon for potato breeding will be more resistant crops and potatoes are a particularly interesting crop in many respects because it's clonally propagated and each clone has a very long life span, for example we still grow potatoes that were bred in the 19th century. So, what this will mean for potato production is that if we can identify genes that control resistance to certain pathogens where, let's say, no resistance or combinations of genes where no resistance exists currently we can make these potatoes more resistant to these pathogens by using these genes.

Interviewer: Looking ahead though, what is the biggest challenge for plant genetics if you like and how big a role can Scotland and this particular institute play in that?

Professor Robbie Waugh: I think Scotland and particularly this institute is a major player already in the crops that it focuses on and, you know, that's very much a product of history and because of the fact the crops that we work on are the crops that we grow mainly in Scotland. So, yes, we will have an impact but our impact will be specifically in the domain of the crops that we grow here. The big challenge we have is starting to address some of the big issues like food security where we need to translate the findings that we have made in the lab into products that are grown in farmers' fields and that these products that are grown in farmers' fields have benefits for not only the farmer but for the society that rely on them as a source of food.