**Abstract from final report**

The genus Pegomya (Diptera: Anthomyiidae) contains a number of agriculturally important species. The sugar beet leaf miners are some of these species of significance as they periodically infest sugar beet crops, causing damage to the crop canopy which results in reduced root growth and therefore yield. Historically the sugar beet leaf miners have been regarded as a minor pest, generally cause minor damage in sugar beet crops in the UK. However, in 2015 and 2016 UK sugar beet growers witnessed a surge in leaf miner populations present in their sugar beet crops and this pest seemingly spread across the sugar beet growing area causing substantial damage to the crop canopy. The reasons behind this surge in population numbers was unknown but it was thought that the pending loss of neonicotinoids, and loss of many marketable pesticides used in the control of leaf miner, may have had an influence. One of the major issues when initially researching sugar beet leaf miners is that the taxonomic standing of the group has been historically very complex. Many of the resources available on the species said to be sugar beet leaf miners are vastly outdated and disconnected, meaning that the current knowledge of sugar beet leaf miners has significant limitations. In this thesis I investigate the identity of the sugar beet leaf miners, by a detailed investigation of existing literature and by using genetic characterisation to identify species groups from specimens collected in the field and their associated ecological data. I found that there are two genetically distinct groups from specimens collected in the UK and abroad, and from a range of hosts. These two genetically distinct groups are likely to be separate species and are seemingly distinguished by host plant range, with one group predominately found on sugar beet and sea beet, and the other on Swiss chard and spinach. I also investigated the 3 phylogenetics of the whole genus in order to understand where the sugar beet leaf miners fit within the wider relationships of other Pegomya species. Findings showed that there was some level of species groupings and groupings of species with similar larval feeding behaviours but that the overall placement of these groups was more uncertain. These findings relied partly on the successful determination of mitochondrial DNA sequences from historical specimens, loaned from museum collections. I report findings on culturing attempts made to rear sugar beet leaf miners and my conceptual plans for the cultures if they had been successful, including investigating the effects on yield and host plant preference. I conclude with a chapter describing the genetic characterisation of parasitoids associated with sugar beet leaf miner. This revealed that there are two species of braconid parasitoids associated with Pegomya samples collected in the Netherlands, and two different, and uncharacterised braconid species reared from UK samples. Overall, the work described in this thesis advances our understanding and characterisation of sugar beet leaf miner by uncovering that it comprises cryptic, genetically distinct, groups, placing it within its wider phylogenetic context and by characterising some of its major parasitoids