INTRODUCTION: The current quality assurance and control tools/methods to prevent and/or to control microbiological risks associated with fresh produce are challenged due to different pressures upon the food supply chain, e.g. changing consumption patterns, globalization and climate change. A conceptual research approach is presented to analyse the complexity of the climate change and globalization challenge on the fresh produce supply chain taken as a case study. The factors which affect the vulnerability of the fresh produce chain demand a multidisciplinary research approach.

RESULTS: Simulation of climate change scenarios and the logistic chain of fresh produce, along with mathematical models to optimize packaging technology to maintain quality and safety of fresh produce are tools to provide insights in the complex dynamic ecosystem. They are the basis for elaboration of risk assessment studies to scientifically support management options and decisions to new microbiological threats related to globalization and climate change in the fresh produce supply chain. Systematic diagnosis of food safety management system performance, using dedicated (system and microbiological) assessment tools, will provide insight in weaknesses and strength of currently implemented food safety management system, in view of current and changing contextual situations, wherein they have to operate. Base line surveys and risk assessment studies on emerging microbiological hazards (due to the changing environment), will provide scientific evidence based insights in emerging safety risks. Sophisticated climate change models combined with comprehensive databases will give insight in global narrative scenarios for climate change. Advanced simulation models will provide insight in impact of different logistics systems designs (scenarios) on specific product quality and safety parameters and total logistics costs. New tools for risk based sampling plans and appropriate microbiological assessment can support monitoring of risks.

CONCLUSION: The proposed knowledge-based modelling system is believed to be a most appropriate way to identify problems and to offer solutions to monitor and prevent microbiological food safety risks during all phases of food production and supply. It will be applied in the EU project VEG-i-TRADE.