

ADOPTION OF PRECISION AGRICULTURE IN SWEDEN – THE CASE OF SOIL MAPS

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ABSTRACT

Precision agriculture is a tool to improve the efficiency of use of inputs and thereby improve resource utilization and reduction of the impact on the surrounding environment. In Sweden, POS (Precision Agriculture Sweden) has worked with precision agriculture since the mid -1990s. Nevertheless, the results in terms of the practical use of the gained knowledge have been limited. Increased site specific fertilization would require more usable and acceptable AgriDSSs, but also clearer incitements and guidelines from the authorities as well as an increased interest from extension services.

Keywords: precision agriculture, soil mapping, decision making, AgriDSS,

INTRODUCTION

Despite new knowledge and technologies there are still few farmers who adopt new decision making models and take advantage of the provided knowledge. Accordingly, it is proposed that agricultural decision support systems (AgriDSSs) must be better adapted to farmers' real needs of knowledge and technology use. This paper aims to describe the farmers' decision-making based on the practical use of soil maps, in relation to farmers' so-called *lifeworld*.

We have used theories from situated and distributed cognition (e.g., Clancey, 1997; e.g., Hutchins, 1995) to capture farmers' *lifeworld* (e.g., Nitsch, 1994) to characterize the learning and decision making processes arising from the

encounters between farmers and advisors. In our pilot project, we have observed farmers and their advisors during meetings and field visits regarding crop production planning during a two-year period (Lindblom and Lundström, to appear). The soil, its physical properties and content of nutrients, is the base for all cultivation on arable land. In Sweden soil mapping is usually geo-referenced, which makes it possible to use for precision fertilization. It is well-known among farmers and advisors that the plant's need for nutrients often varies within fields. Requirements for soil mapping are built into both subsidies and certifications. But in the documents that serve as the basis for extension and fertilization planning it is not stated explicitly that one has to consider the variation in crop nutrient needs within the actual field. Thus, those recommendations can be interpreted as the basis for calculation of mean values in the same way as they always have been done. Only a minority of farmers are utilizing soil maps as the basis for varied phosphorus and potassium fertilization, even where there is a potential for increased revenue in form of a higher quality in certain specialty crops.

Appropriate implementation of site-specific fertilization puts demands for new technology, which in turn may require new investments. It also highlights the farmers' need for gaining knowledge and their own interest to implement varied interventions. Advisors rarely offer support in calculating the prescription map and machinery from a precision agriculture perspective, but when they do, the prevalence for site-specific fertilization is increased. Our results show that farmers' decisions are mainly based on "thumb rules", tacit knowledge and their own experience (Lindblom and Lundström, to appear). Moreover, the crop planning process has moved from paper representations to digital representations that simplifies certain calculations. However, the fundamental way of doing the planning is still almost following the same track, i. e., the starting point for the discussion is the field as a whole.

AgriDSSs that are able to handle site specific fertilization are available on the market. The use of site-specific fertilization is discouraged if available AgriDSSs do not meet farmers' needs for usability, farmers' perceived lack of support and relevant information about precision fertilization, and advisors' lack of information and interest for the issue. This corresponds to the lack of distinct recommendations both in Sweden and in the EU. If no evident or well-defined indicators from outside the agricultural system are explicitly addressed, work will continue as it always has been done. Increased site specific fertilization would require more usable and acceptable AgriDSSs, but also clearer incitements and guidelines from the authorities as well as an increased interest from extension services.

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