HOW CORN IS CULTIVATED IN FRANCE?
A CROPPING SYSTEMS TYPOLOGY TO SUPPORT PUBLIC DECISION MAKING ON GENETICALLY MODIFIED CULTIVARS

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INTRODUCTION

EU member-states have to consider social and economic dimensions, to support their decisions about genetically modified organism (GMO). To assess the impacts of authorizing or not GMO's cultivation, a baseline is required. GM cultivars are not authorized in France, even for corn (*Zea mays L.*) which is the second crop in terms of acreage.

Thus, a typology of current cropping systems was carried out for this crop to identify the potential agronomic interest of GM cultivars.

MATERIAL & METHODS

A public dataset: http://agreste.agriculture.gouv.fr/enquetes/pratiques-culturales

➔ 5000 plots surveyed

➔ detailed corn crop management plan (CMP) in 2011 ((soil tillage, sowing practices, fertilization, pest management, irrigation...)

➔ additional information about years 2006-2010 (sequence of crops, manure and plowing) practices.

Factor analysis (FA) combined to hierarchical clustering (HC) at two scales: (i) CMP and (ii) crop sequence (including manure and plowing information) ➔ combined into a cropping system (CS) typology (Fig. 1).
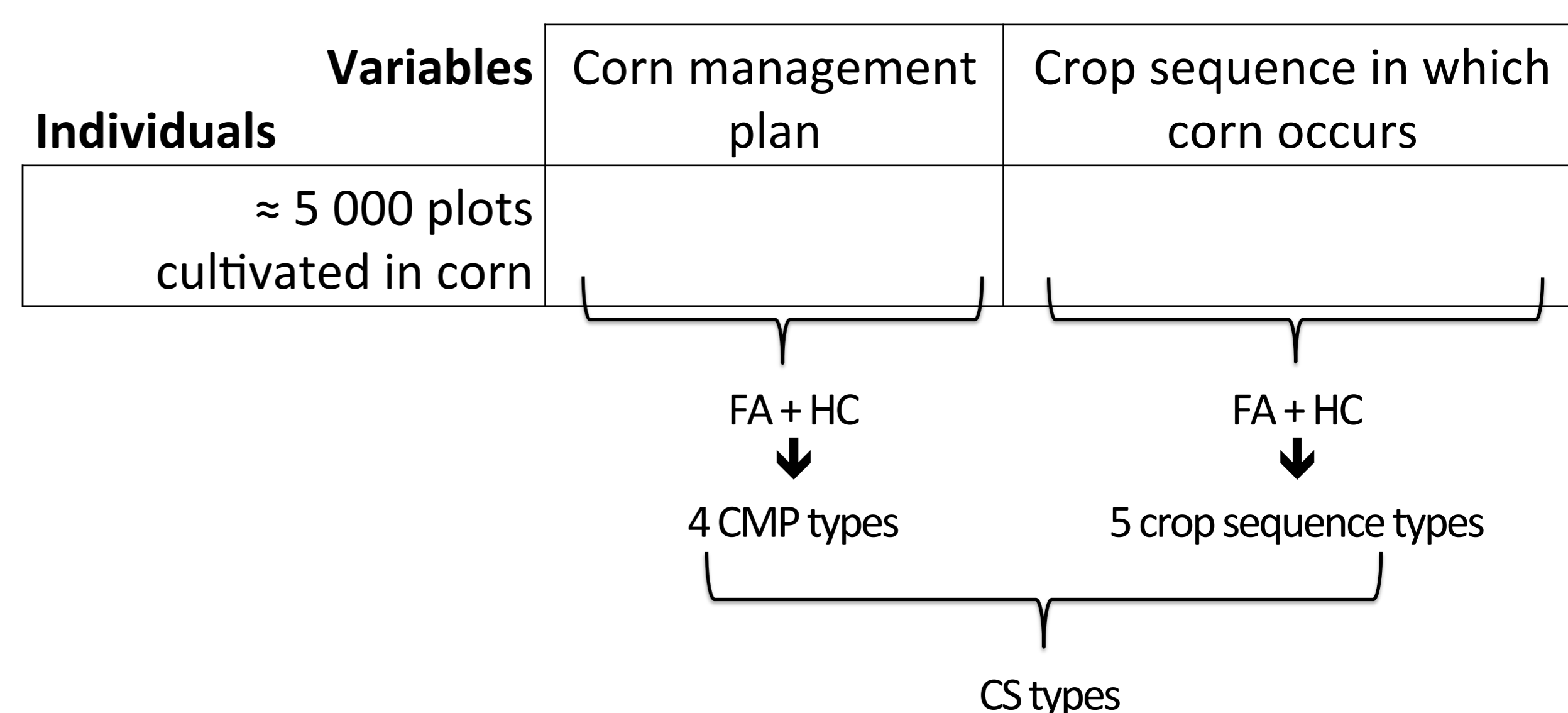

Figure 1: Overall analysis approach to build a corn cropping systems typology

RESULTS

➔ **4 CMP** types dedicated to corn (Fig. 2)

➔ **5 crop sequence** types in which corn occurs

A- Corn monocropping with frequent plowing and manure (13%)

B- Corn monocropping with frequent plowing and no manure (17%)

C- Corn rotating with straw cereals, frequent plowing and regular manure (35%)

D- Corn rotating with straw cereals, occasional plowing and no manure (16%)

E- Crop sequences with meadows (19%)

➔ **9 dominant CS** types gathering 75% of the sample (Fig. 3), including:

- 4 CS typical of grain production
- 3 CS typical of silage production
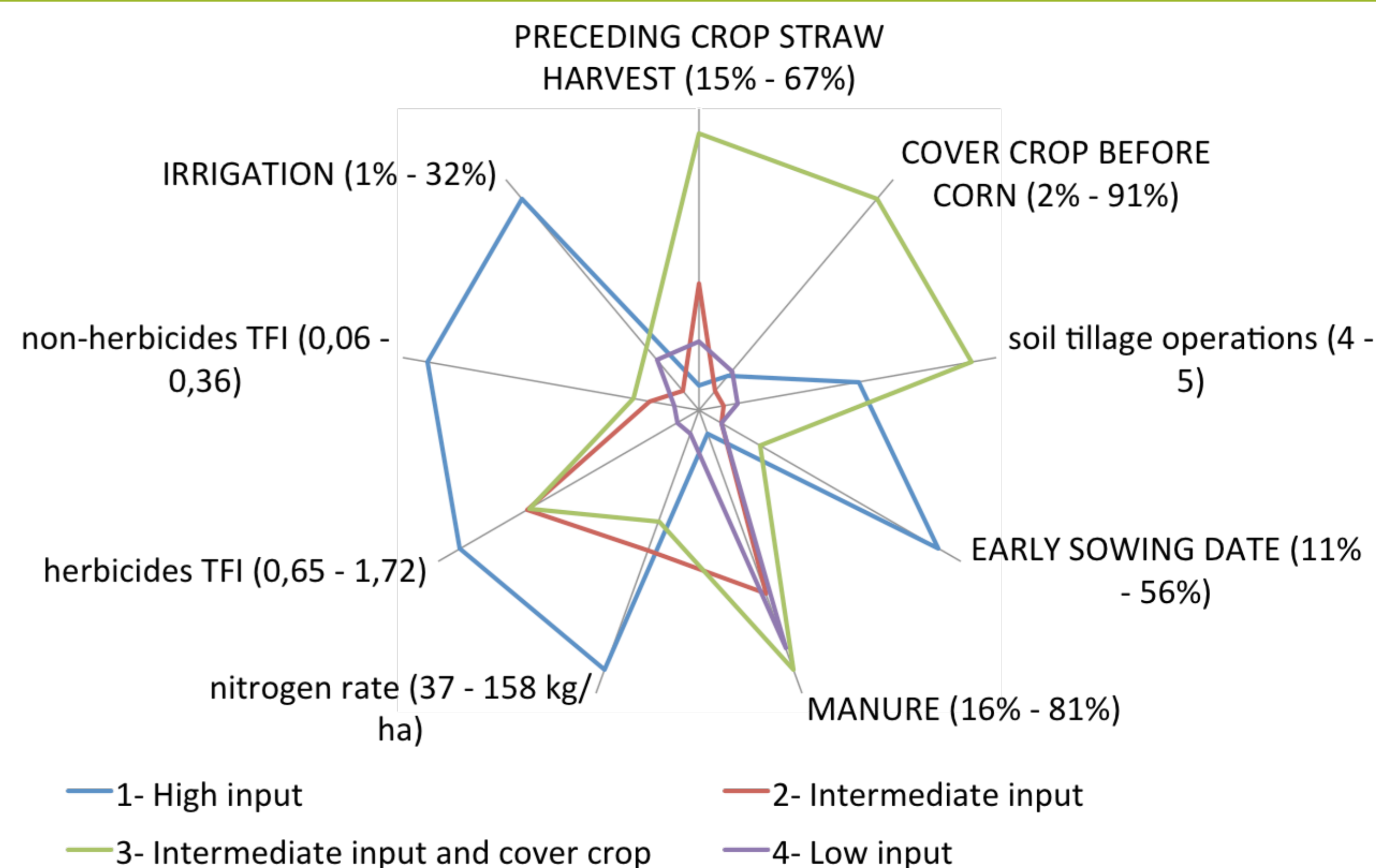- 2 CS linked to both silage and grain production

Figure 2: Characteristics of corn CMP types
categorical variables in upper case / continuous variables in lower case
min / max values observed among types are given in parenthesis, and correspond to the inner / outer border of the graph respectively
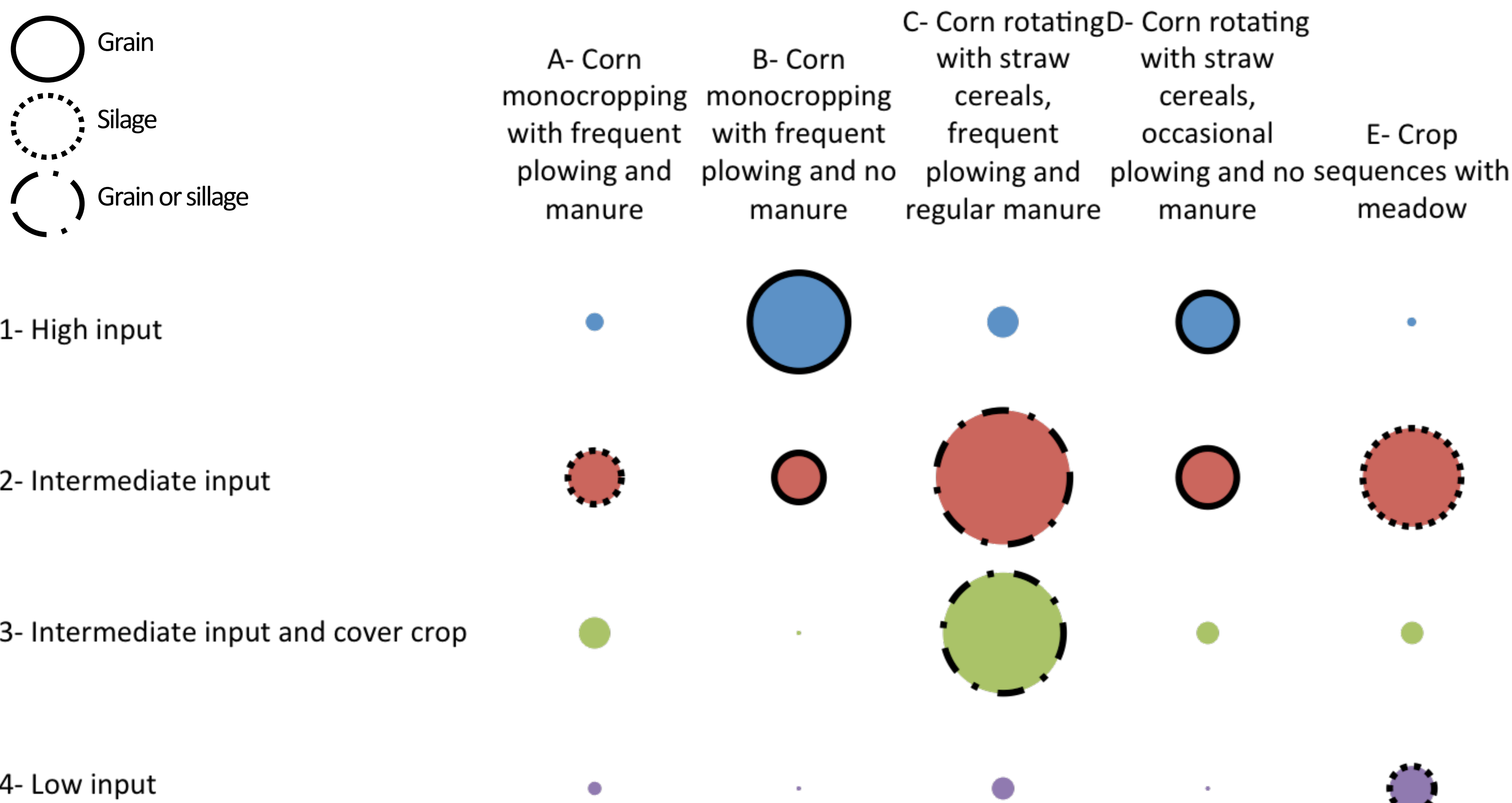

Figure 3: Plot distribution by CS type
circle diameter is proportional to the number of plots

CONCLUSION & PERSPECTIVES

This analysis was also performed on older datasets (2001 and 2006) to approach cropping practices evolution. On the basis of CS types characteristics, economic, environmental and social indicators were assessed (results not shown).

These results formed a basis to assess the potential adoption of GM cultivars (e.g., as two CS concentrate plots with corn borer insecticide, Bt-cultivars adoption seems not to be investigated for the other CS).

Then, it could be used as a baseline for assessing scenarios of GM-cultivars adoption, with relevant environmental, economic and social indicators calculation.

This approach could be applied for any crops, to assess impacts of any cropping innovation.