Introduction

Temperate agroforestry has been described and categorized several times and there are numerous definitions in use. Even though several agroforestry practices have been traditionally used in Czechia, any inventory of farms or plots where agroforestry is currently practiced is still missing. In all definitions of agroforestry practices there is a common requirement: trees and crops (or animals) have to be present on one unit of land, however the unit itself is not specified. In Czech Republic, all productive farmland is registered in the land registry as 'farm blocks' and 'parts of farm blocks'. Those units of farmland are considered most adequate to use for inventory of agroforestry, however there might be different farmland inventories in different countries, hence these might not be an option elsewhere. This study aimed to find a practical and relatively easy method to identify agroforestry systems on agricultural land (trees grown on agricultural land together with crops or animals) and try it out to estimate the extension of agroforestry in the country. However, we have expected that agroforestry is not a common land use system in the country.

Results

Using this try-out method we estimated 3,071 hectares of agricultural land blocks with trees in Czech Republic. Most of those areas were concentrated in the South Moravia region where such traditional farming systems surround villages and small towns and form a very heterogeneous landscape. The 25 areas containing most hectares of agricultural land blocks containing both trees and crops were projected on a map and 23 of them are located in one area, most in proximity of towns Velké Pavlovice, Louka u Ostružo, Strážnice na Moravě, Moravský Žalov, or Šaštín (Figure 1). The area is well known for its wine production and for intensive fruit tree orchards.

We identify the system, which is still quite widespread throughout Czechia and Eastern Europe including Czechia, is streuobst. It is defined as 'all trees of different types and varieties of fruit, belonging to different age groups, which are dispersed on cropland, meadows and pastures in a rather irregular pattern' (Herzog 1998).

It can be classified, according to Nair (1993), as 'plantation crops with pastures and animals' or as a 'plantation crop combination' (if the fruit trees are combined with arable crops). Tree density varies from about 20 to 100 trees·ha⁻¹. The most extended practice in the Czechia is silvopastoral form of streuobst (pastený sad - extensive fruit orchards grazed by sheep and cattle, Figures 2 and 3) remaining in sites with less favorable conditions for intensive agriculture (e.g. mountains – regions of South Moravia and Bohemian Forest). The use of hedges and live fences along the field borders, streams and slope contours has also a long tradition in the Czech Republic and can also be classified as agroforestry.

Unfortunately, the era of joining fields to larger block during collective farming led to their drastic reduction, however some remnants can still be found, again in mountain areas.

Materials and Methods

Firstly, several European surveys such as Land Use and Cover Area frame Survey (LUCAS) and Corine Land Cover (CLC) were examined to evaluate their applicability in inventory of agroforestry, and several methods of identifying trees in agricultural land blocks were reviewed. LUCAS coordinates with both trees and agricultural production were separated in ArcGIS software and compared with the layer of CLC, with the hypothesis that they should match vectors with corresponding land-use system. It was found that those point features were not suitable for estimating the area of agroforestry.

We found as the most appropriate method used to quantify the area of agroforestry in Czech Republic was using the Corine Land Cover data in ArcGIS software to identify out patches of land that fall into the annual crops with permanent crops category. Using orthophotographic imagery of Czechia the ArcGIS software and the online LIPS (Land-Parcel Identification System) registry of agricultural land, only the agricultural land blocks in those CLC patches containing trees were recorded and their areas were summarized.

In the following part of the study, farmers owning plots in the agroforestry field blocks were found in the land registry and a questionnaire was sent out to them regarding the origin, function, and use of the trees in the agricultural blocks to collect information about history of the areas and a social perspective of the land-use systems.

Discussion

The study has reviewed how quantification of agroforestry on farmland can be done in practice. The method used in the study has found only around 3,000 hectares of agricultural land with trees, mostly in the region of Southern Moravia, which is a relatively small numbers. However, the results were not very conclusive and seemed to only aim at one kind of land-use system. The method has met several limitations on the way. This study has shown that small but significant area of traditional farming systems combining trees (mainly traditional fruits) and agricultural crops is still remaining in small-holders. It also provides valuable data for further study of agroforestry on farmland in Czechia.