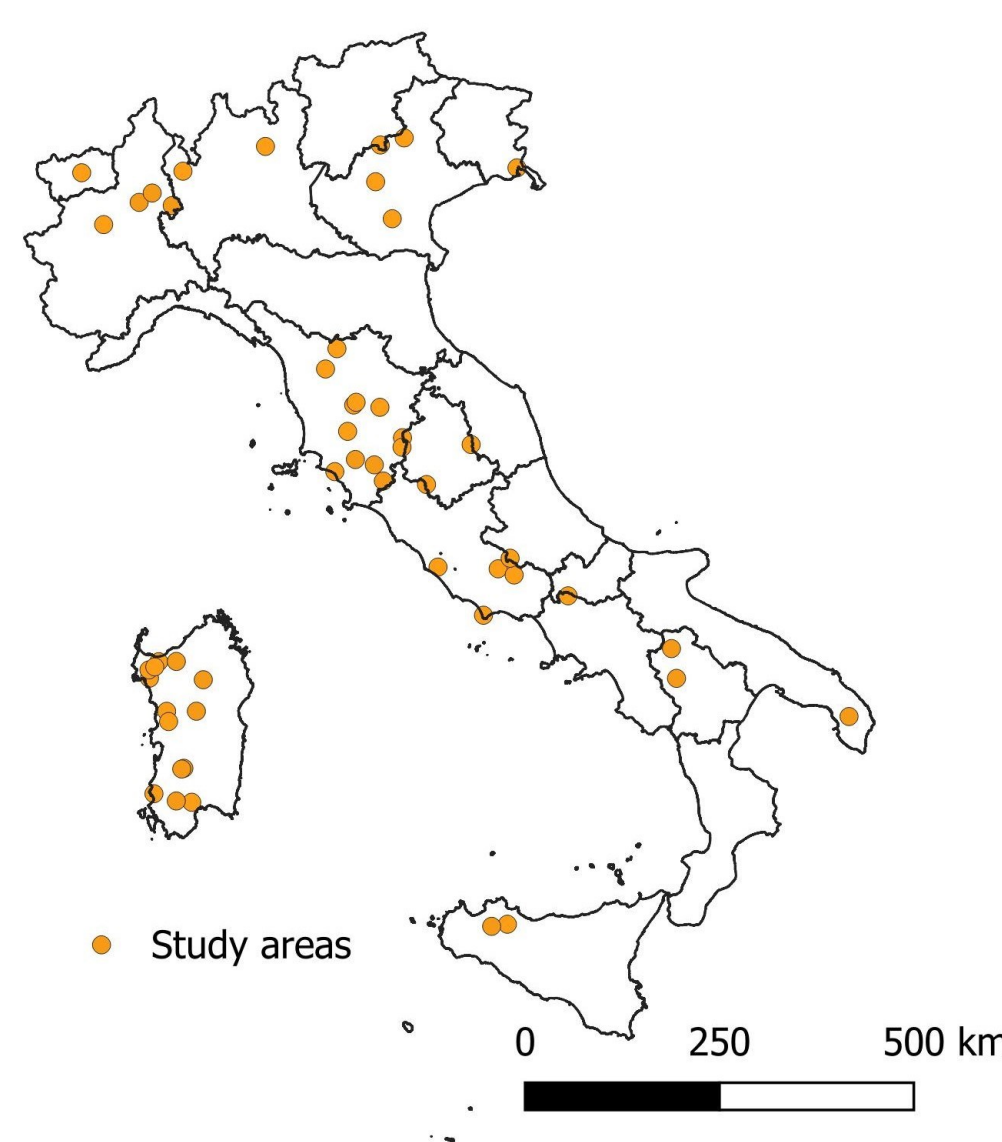


# Uniqueness matters: patterns of $\alpha$ and $\beta$ -diversity highlight conservation priorities for plant communities in Italian agricultural landscapes

Fanfarillo E<sup>1,2</sup>, Angiolini C<sup>1,2</sup>, Bacaro G<sup>3</sup>, Bacchetta G<sup>4</sup>, Bagella S<sup>5,6</sup>, Barni E<sup>7</sup>, Bonari G<sup>1,2</sup>, Buffa G<sup>8</sup>, Caldarella O<sup>9</sup>, Calderisi G<sup>10</sup>, Canella M<sup>11</sup>, Cannucci S<sup>1,2</sup>, Caria MC<sup>5</sup>, Castello M<sup>3</sup>, Cogoni D<sup>10</sup>, Chiaffarelli G<sup>12</sup>, Cuena-Lombrana A<sup>4</sup>, D'Agostino M<sup>13</sup>, Dalle Fratte M<sup>14</sup>, de Simone L<sup>1</sup>, Del Vecchio S<sup>13,15</sup>, Deola T<sup>16</sup>, Fantinato E<sup>8</sup>, Farris E<sup>5</sup>, Fenu G<sup>10</sup>, Fiaschi T<sup>1</sup>, Fois M<sup>4</sup>, Gianguzzi L<sup>2,17</sup>, Lastrucci L<sup>18</sup>, Lazzaro L<sup>19</sup>, Lonati M<sup>20</sup>, Lozano V<sup>21</sup>, Maccioni A<sup>5</sup>, Mainetti A<sup>22</sup>, Marengo G<sup>20</sup>, Mascia F<sup>1</sup>, Minuzzo C<sup>7</sup>, Misuri A<sup>19</sup>, Mugnai M<sup>19</sup>, Murgia L<sup>23</sup>, Pafumi E<sup>1,2</sup>, Patera G<sup>24</sup>, Potenza G<sup>25</sup>, Rosati L<sup>25</sup>, Sarmati S<sup>2,13</sup>, Siccardi E<sup>19</sup>, Tavilla G<sup>26</sup>, Tiloca MT<sup>21</sup>, Tomaselli V<sup>27</sup>, Vagge I<sup>12</sup>, Viciani D<sup>19</sup>, Zangari G<sup>13</sup>, Maccherini S<sup>1,2</sup>

<sup>1</sup>University of Siena; <sup>2</sup>NBFC; <sup>3</sup>University of Trieste; <sup>4</sup>Centre for Conservation of Biodiversity (CCB), University of Cagliari; <sup>5</sup>University of Sassari; <sup>6</sup>Desertification Research Centre, University of Sassari; <sup>7</sup>University of Turin; <sup>8</sup>University of Venice; <sup>9</sup>Independent Researcher, Via Maria SS. Mediatrice 38, Palermo; <sup>10</sup>University of Cagliari; <sup>11</sup>University of Padua; <sup>12</sup>University of Milan; <sup>13</sup>University of Roma Tre; <sup>14</sup>University of Insubria; <sup>15</sup>University of Bologna; <sup>16</sup>University of Bayreuth; <sup>17</sup>University of Palermo; <sup>18</sup>University of Florence; <sup>19</sup>University of Florence; <sup>20</sup>University of Turin; <sup>21</sup>University of Sassari; <sup>22</sup>Gran Paradiso National Park; <sup>23</sup>Via Santa Caterina 7, Carbonia; <sup>24</sup>Studio Fagus, Concorezzo; <sup>25</sup>University of Basilicata; <sup>26</sup>National Research Council of Italy; <sup>27</sup>University of Bari "Aldo Moro"

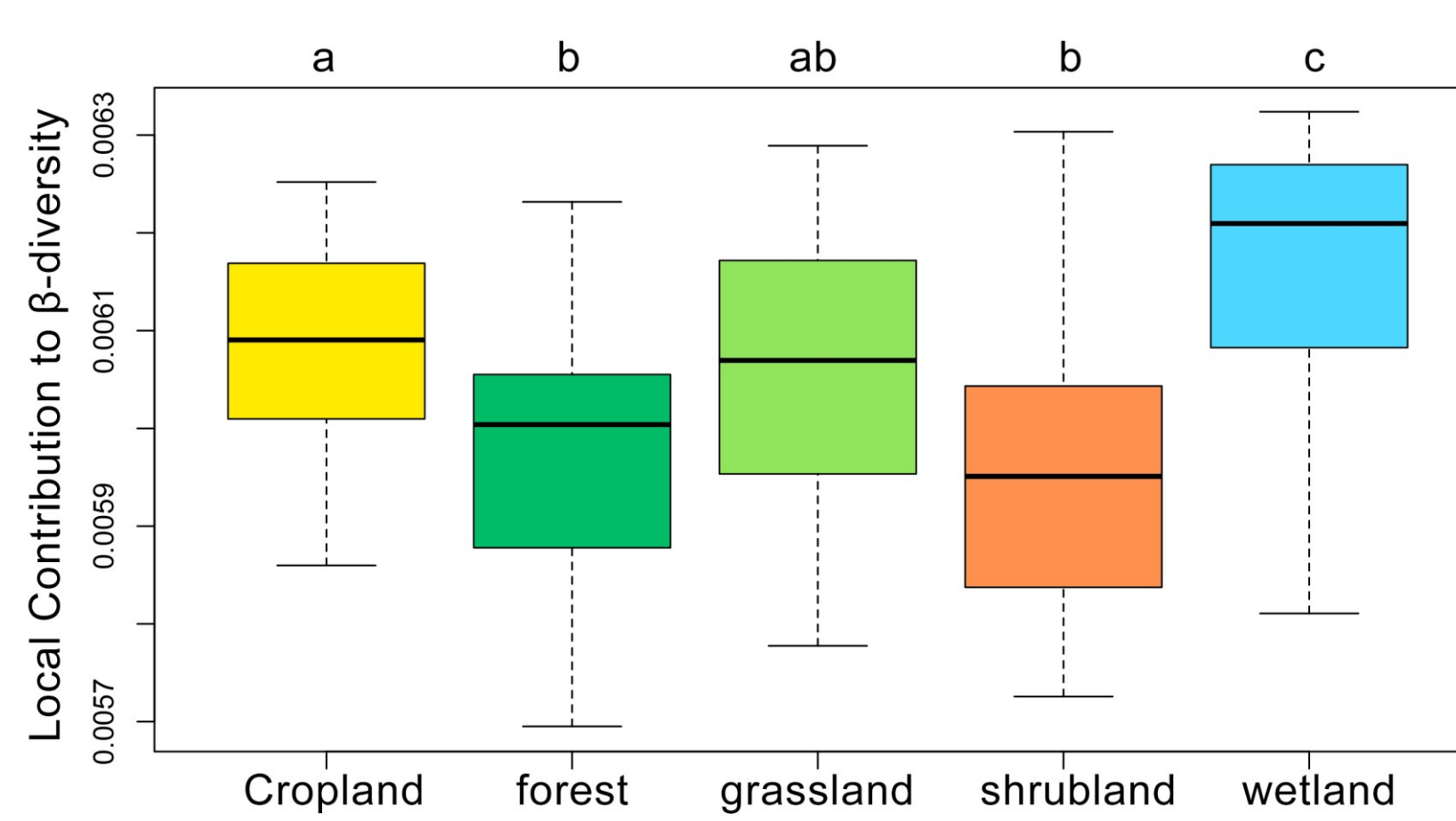
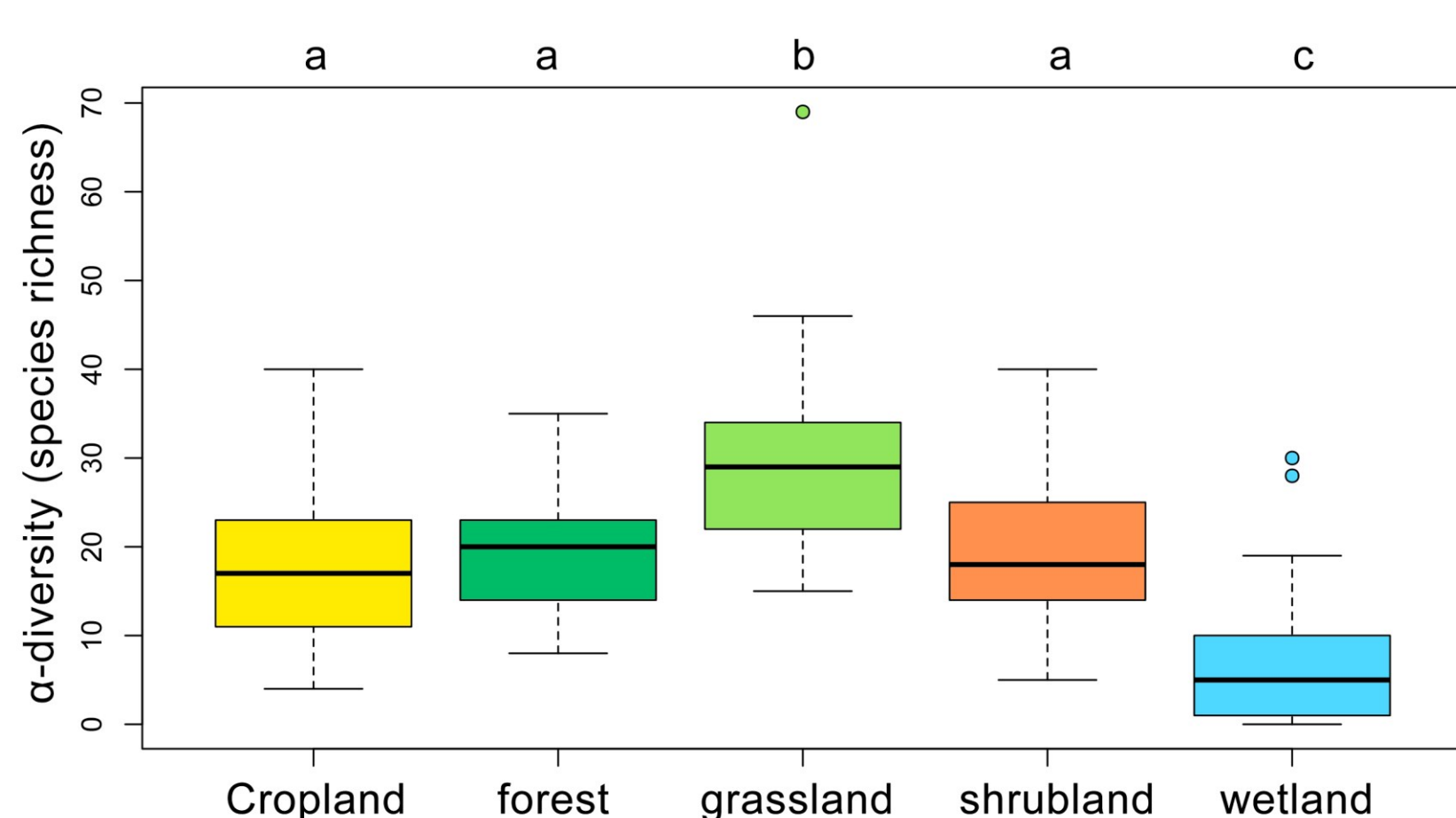
Agricultural landscapes can host a diversified mosaic of different ecosystems and habitat types, each supporting specific plant communities. Though it is acknowledged that habitat diversification is crucial for the maintenance of a high farmland biodiversity, there is still lack of quantitative information on the contribution of different plant community types to biodiversity in agricultural landscapes. Here, we aimed at highlighting the conservation priorities for the plant communities of different ecosystems across Italian agricultural landscapes through an analysis of their contribution to biodiversity.



51 circular study areas of 1 km radius.

Vegetation sampling in croplands, forests, grasslands, shrublands, wetlands: square plots of 25 m<sup>2</sup> size.

We compared the five ecosystem types in terms of plant community  $\alpha$ -diversity,  $\beta$ -diversity, and species composition using analysis of variance and Indicator Species Analysis (INSPAN).



Grassland plant communities were the species-richest and wetland plant communities were the species-poorest. By contrast, the latter had the highest Local Contribution to Beta Diversity due to their uniqueness in species composition.

Species	SCBD
<i>Phragmites australis</i>	0.024371602
<i>Prunus spinosa</i>	0.021952752
<i>Rubus ulmifolius</i>	0.019882528
<i>Myriophyllum spicatum</i>	0.018280297
<i>Cornus sanguinea</i>	0.014677318
<i>Quercus cerris</i>	0.013944897
<i>Quercus pubescens</i>	0.013223803
<i>Lemna minor</i>	0.012652517
<i>Crataegus monogyna</i>	0.011065955
<i>Quercus ilex</i>	0.010151648
<i>Acer campestre</i>	0.00973291
<i>Cytisus villosus</i>	0.009526767
<i>Pistacia lentiscus</i>	0.009476622

Wetland species, shrubs, and trees gave the highest contribution to  $\beta$ -diversity. All the ecosystem types differed from one another in plant community species composition based on PERMANOVA, and they hosted distinctive species based on INSPAN.



**Top indicator species**  
 Cropland: *Papaver rhoeas*  
 Shrubland: *Prunus spinosa*  
 Forest: *Acer campestre*  
 Grassland: *Dactylis glomerata*  
 Wetland: *Phragmites australis*



- Wetlands hold the highest conservation priority for plant diversity in Italian agricultural landscapes due to their uniqueness
- Each studied ecosystem is important for the conservation of certain plant species
- To maintain high levels of vascular plant diversity, it is necessary to maintain diversified agricultural landscapes that include natural, semi-natural, and anthropogenic ecosystems

