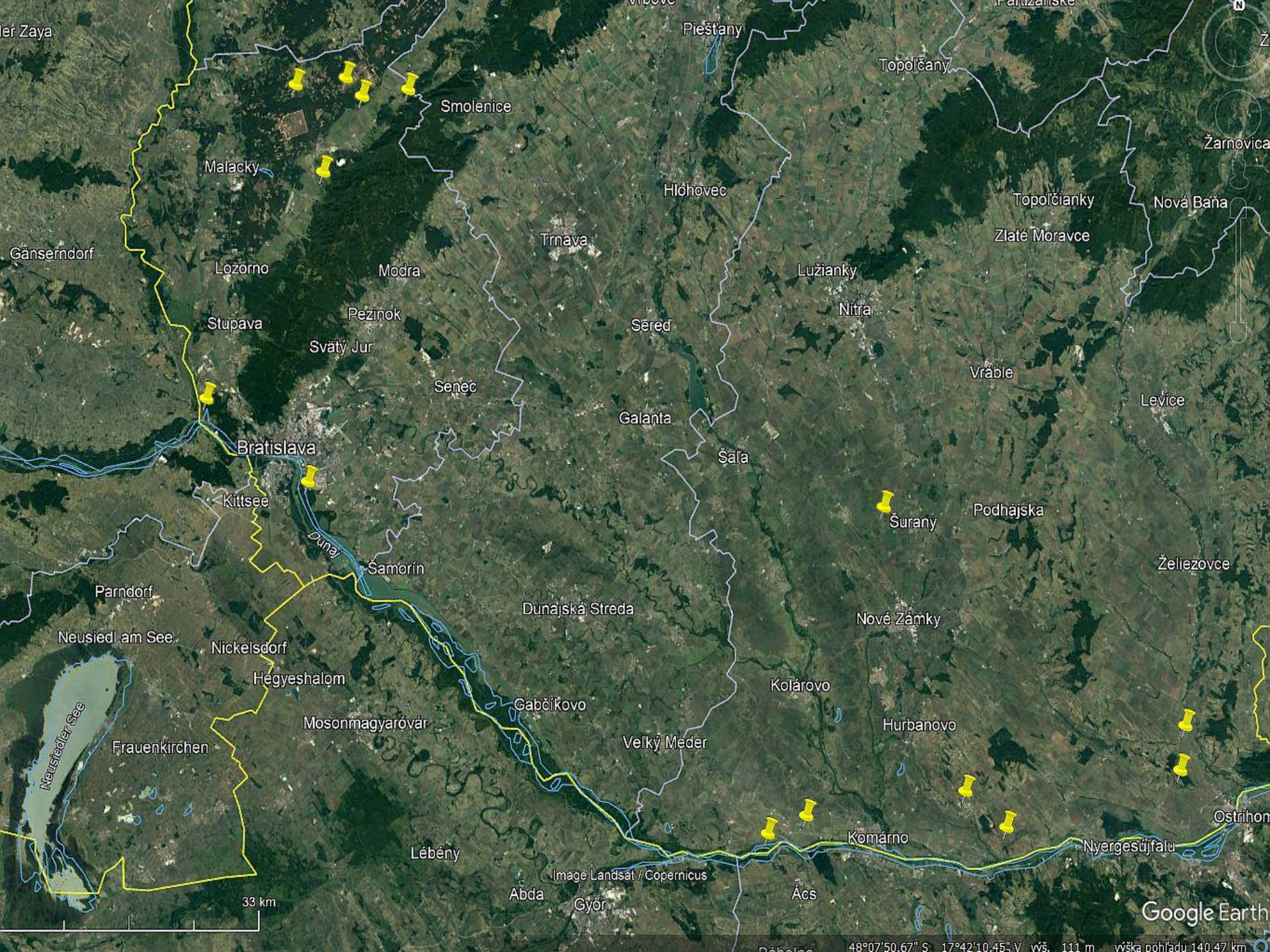


# Ochrana biodiverzity a antiparazitiká





er Zaya

Pieštany

Topoľčany

Smolenice

Malacky

Hlohovec

Žarnovica

Nová Baňa

Topoľčianky

Zlaté Moravce

Gänserndorf

Trnava

Lužianky

Lozorno

Modra

Stupava

Pezinok

Sereď

Nitra

Svätý Jur

Senec

Vráble

Levice

Bratislava

Galanta

Šala

Kittsee

Šurany

Podhájska

Dunaj

Šamorín

Želiezovce

Parndorf

Dunajská Streda

Nové Zámky

Neusiedl am See

Nickelsdorf

Hegyeshalom

Gabčíkovo

Kolárovo

Mosonmagyaróvár

Veľký Meder

Hurbanovo

Frauenkirchen

Lébény

Image Landsat / Copernicus

Ács

Nyergesújfalu

Ostrihom

33 km

Abda

Győr

Google Earth

48°07'50.67" S 17°42'10.45" V wš. 111 m wška pohľadu 140.47 km































*Sigorus porcus*



*Coprimorphus scrutator*



*Copris lunaris*



*Geotrupes spiniger*





*Gymnoleurus mopsus mopsus*



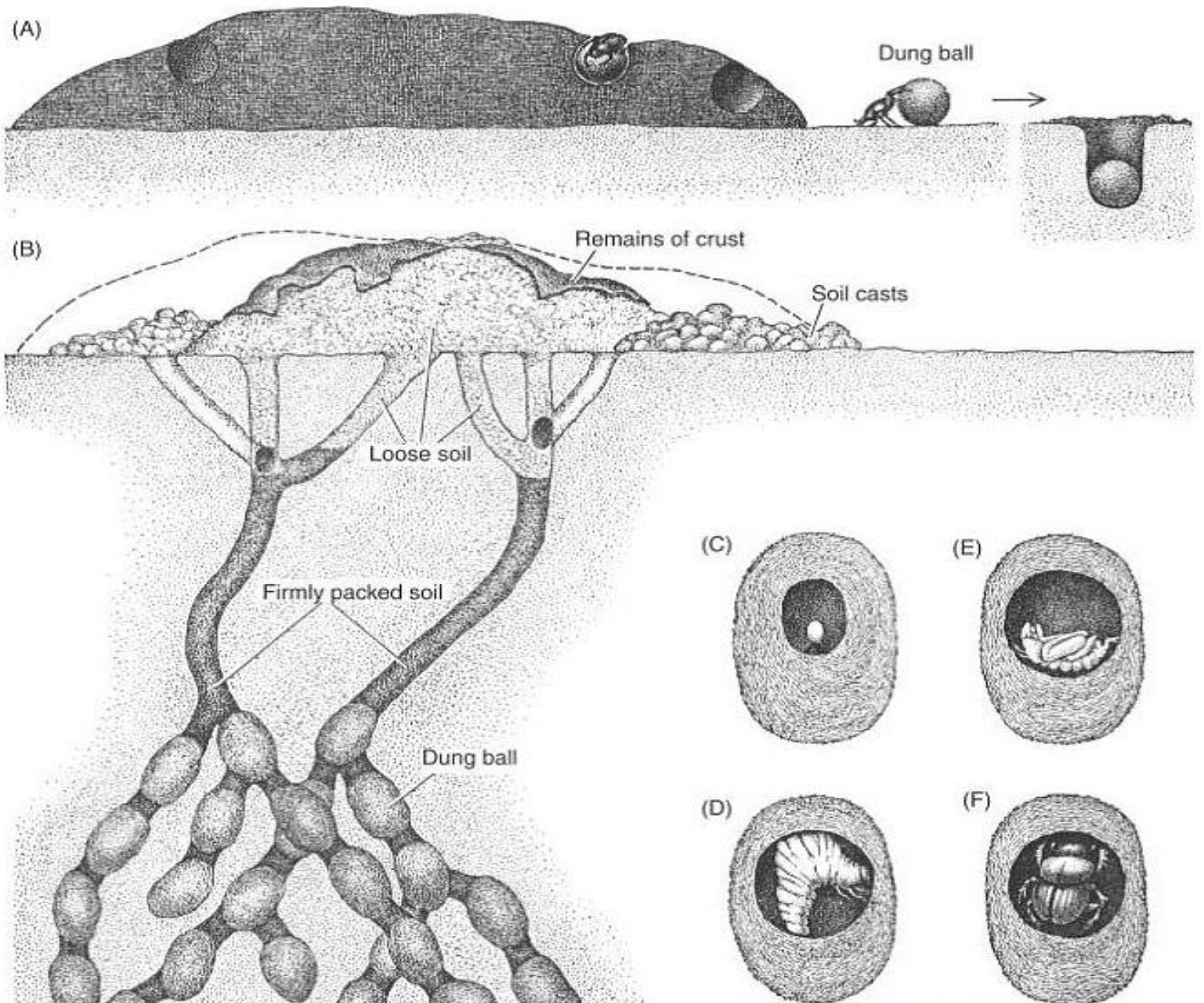
*Euoniticellus fulvus*



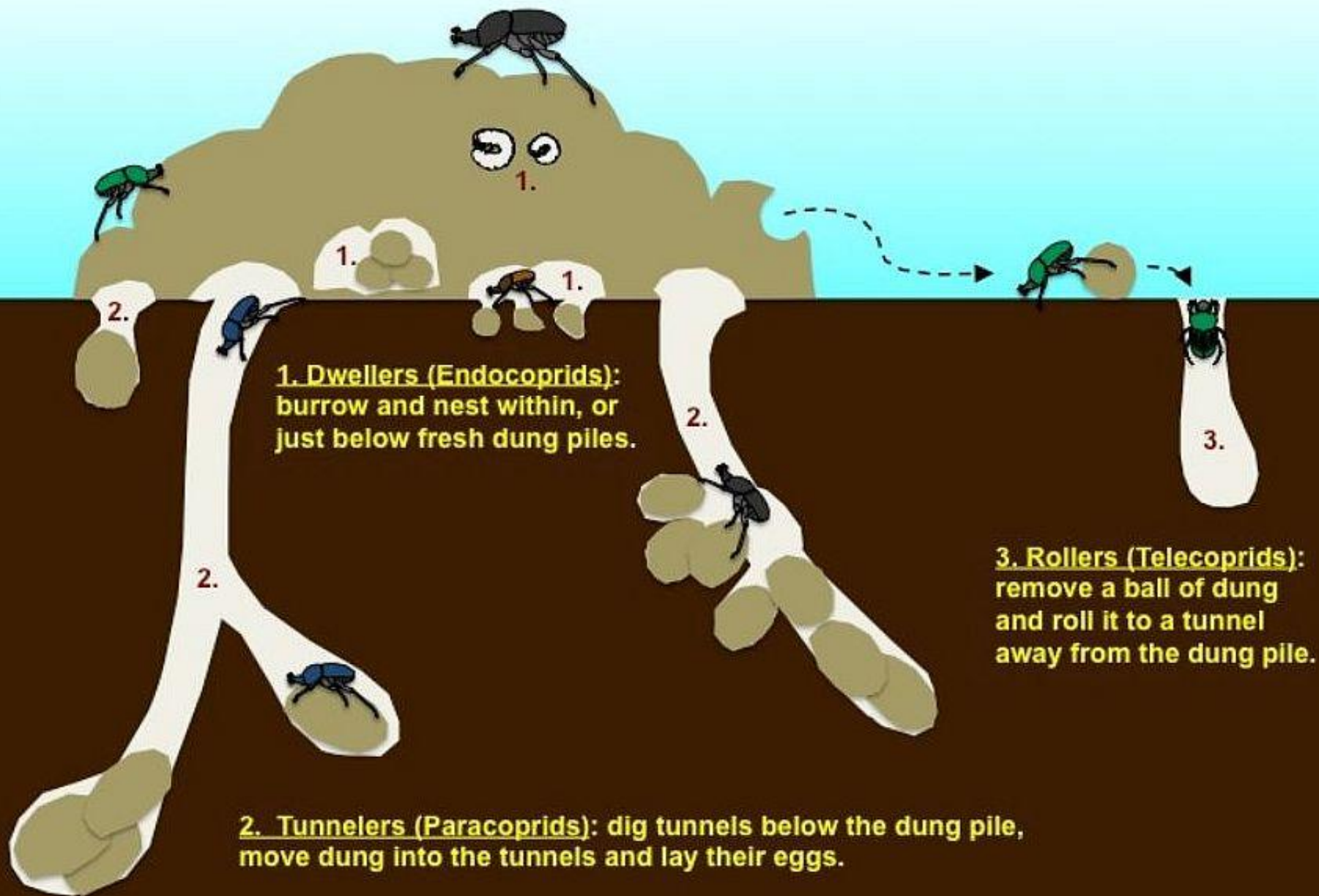
*Euheptaulacus sus*



*Onthophagus vacca*



# Functional Types of Dung Beetles



**1. Dwellers (Endocoprids):** burrow and nest within, or just below fresh dung piles.

**2. Tunnelers (Paracoprids):** dig tunnels below the dung pile, move dung into the tunnels and lay their eggs.

**3. Rollers (Telecoprids):** remove a ball of dung and roll it to a tunnel away from the dung pile.

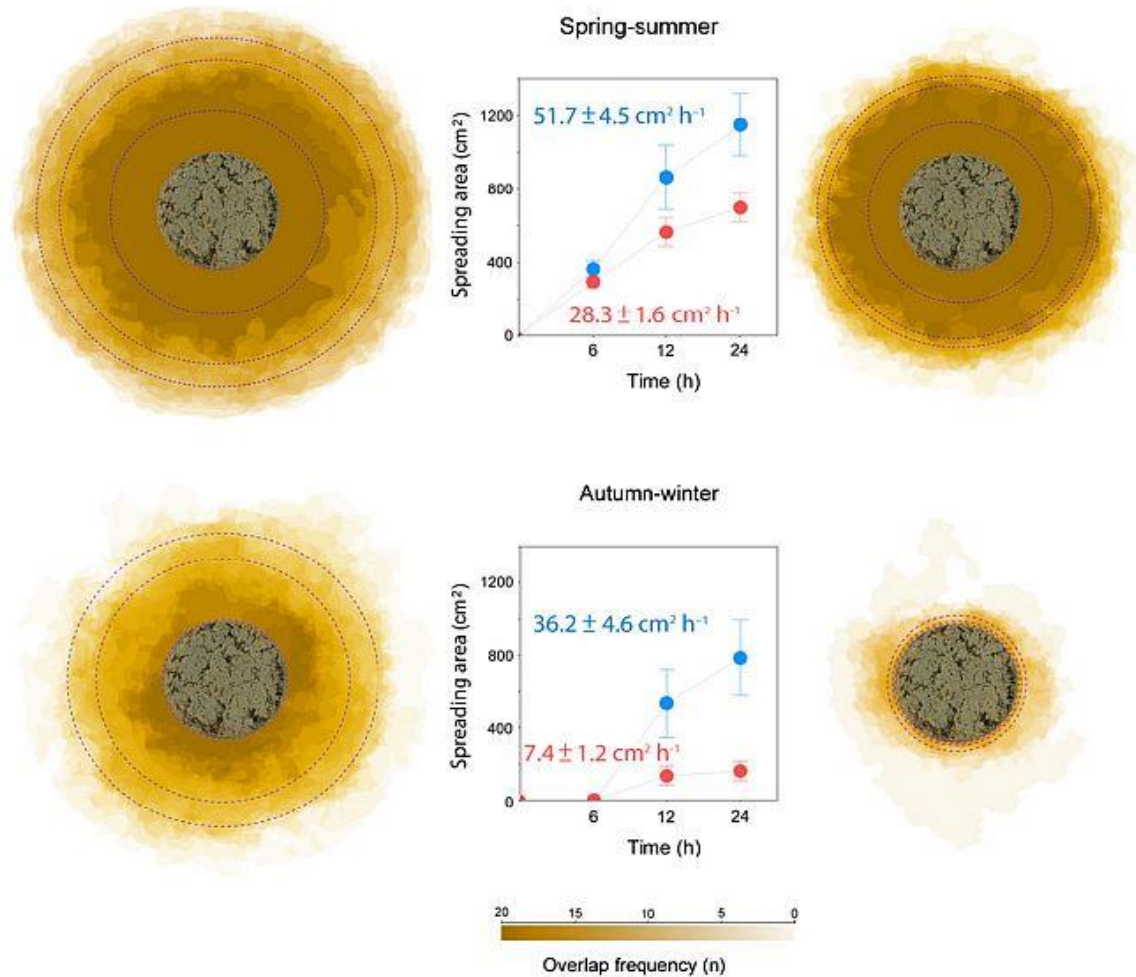


Lajniak skarabeusovitý (*Sisyphus schaefferi*)

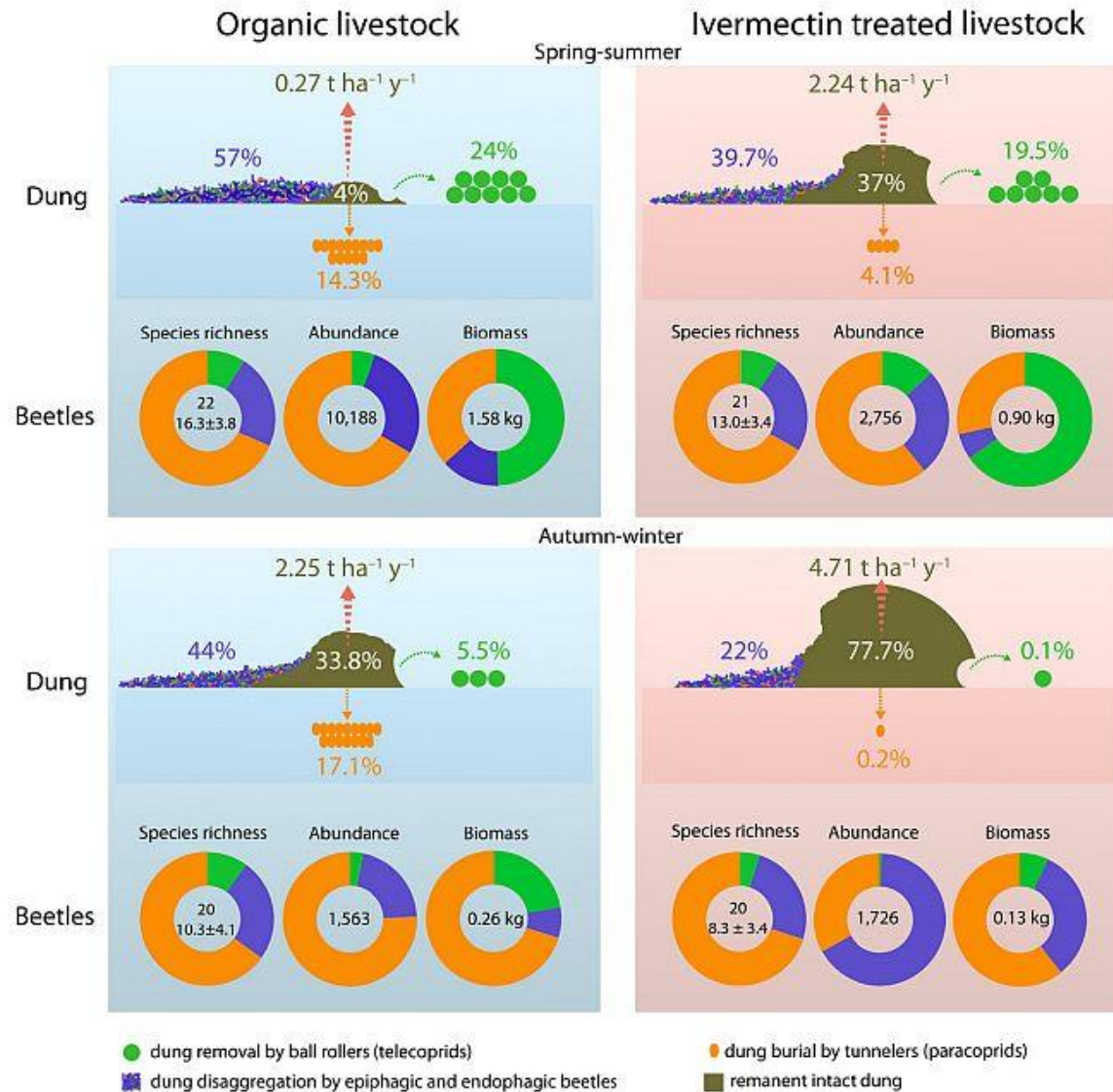


Organic livestock

Ivermectin treated livestock



**Fig. 3.** Rates of dung spreading in conventional and organic livestock systems. Concentric circles (0, 6, 12 and 24 h) in each superposition image. Dots in the graphs (seasons; blue dots = spring-summer; red dots = autumn-winter) represent the average area (mean ± s.e.m.; n = 20 for each treatment) of dung spreading (in cm<sup>2</sup>) at 6, 12 and 24 h, respectively. Dung spreading rates are expressed in cm<sup>2</sup> h<sup>-1</sup> for each livestock management system (ECO and IVM sites) and season. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)



**Fig. 4.** Schematic summary of differences in dung beetle assemblage structure and ecological function in conventional and organic livestock systems. Assemblage structure is depicted by species richness (cumulative and average number of species: mean ± s.d.), abundance (total number of individuals) and biomass (total fresh dung beetle weight in kg). Average percentages of dung rolled away by telecoprids (in green), disaggregated (in a mixture of blue, green and orange outlines) by *endo*- and epiphagic beetles, and buried by paracoprids (in orange) are also represented. The average percentage of the dung pat not processed by dung beetles (in dark green) and an estimation of the amount of manure accumulated on the soil surface (in t ha<sup>-1</sup> y<sup>-1</sup>) are also provided.

**Tab. č.1: Prehľad zistených koprofágnych druhov chrobákov na jednotlivých lokalitách**

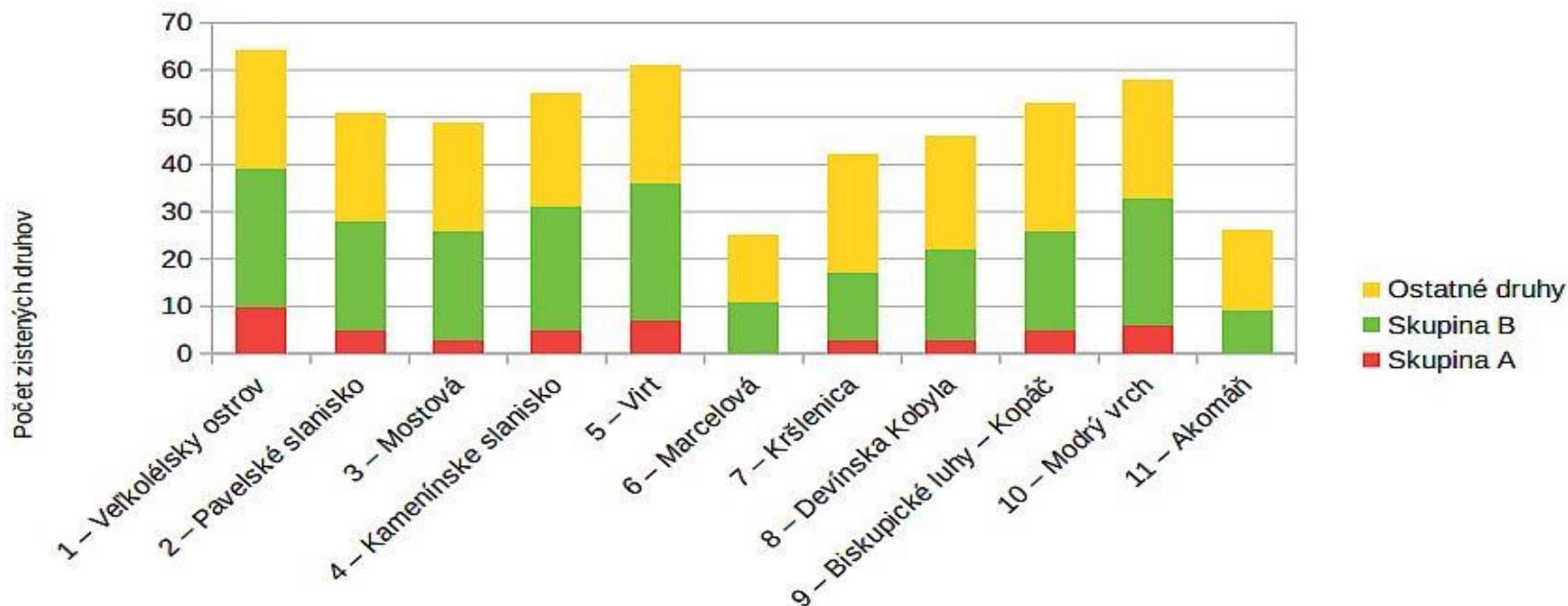
Čeľad'	Druh	Významnosť druhu, lokalita s výskytom
Geotrupidae	<i>Anoplotrupes stercorosus</i> (Scriba, 1791)	1, 7, 8, 9,
Geotrupidae	<i>Geotrupes spiniger</i> (Marsham, 1802)	1, 2, 3, 4, 5, 9, 10, 11
Geotrupidae	<i>Trypocopris vernalis vernalis</i> (Linnaeus, 1758)	1, 7, 8, 9,
Scarabaeidae	<i>Acanthobodilus immundus</i> Creutzer in Panzer, 1799	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Acrossus depressus</i> (Kugelann, 1792)	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
Scarabaeidae	<i>Acrossus luridus</i> (Fabricius, 1775)	1, 2, 3, 4, 5, 6, 8, 9, 10, 11
Scarabaeidae	<i>Acrossus rufipes</i> (Linnaeus, 1758)	1, 2, 3, 4, 5, 9, 10,
Scarabaeidae	<i>Agriolus ater</i> (DeGeer, 1774)	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
Scarabaeidae	<i>Ammoecius brevis</i> Erichson, 1848	1, 7, 8, 10,
Scarabaeidae	<i>Aphodius fimetarius</i> (Linnaeus, 1758)	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
Scarabaeidae	<i>Aphodius foetidus</i> (Herbst, 1783)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Aphodius pedellus</i> (DeGeer, 1774)	1, 2, 3, 4, 5, 9, 10,
Scarabaeidae	<i>Biralus satellitius</i> (Herbst, 1789)	1, 2, 3, 4,
Scarabaeidae	<i>Bodiloides ictericus ictericus</i> (Laicharting, 1781)	1, 2, 3, 4, 5, 8, 9, 10,
Scarabaeidae	<i>Bodilopsis rufa</i> (Moll, 1782)	1, 2, 3, 4, 5, 9, 10,
Scarabaeidae	<i>Bodilus lugens</i> Creutzer in Panzer, 1799	1, 2, 3, 4, 5, 6, 10, 11
Scarabaeidae	<i>Calamosternus granarius</i> (Linnaeus, 1767)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Colobopterus erraticus</i> (Linnaeus, 1758)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Coprimorphus scrutator</i> (Herbst, 1789)	1, 2, 3, 4, 5, 9, 10,
Scarabaeidae	<i>Esymus pusillus pusillus</i> (Herbst, 1789)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Euheptaulacus sus</i> (Herbst, 1783)	1, 5,
Scarabaeidae	<i>Eurodalus coenosus</i> (Panzer, 1798)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,
Scarabaeidae	<i>Eurodalus paracoenosus</i> Balthasar et Hrubant, 1960	1, 2, 3, 4, 5, 7, 8, 9, 10,
Scarabaeidae	<i>Euplerus subterraneus subterraneus</i> (Linnaeus, 1758)	1, 2, 3, 4, 5, 7, 8, 9, 10,
Scarabaeidae	<i>Chilothorax distinctus distinctus</i> (O.F. Muller, 1776)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Chilothorax paykulli</i> Bedel, 1907	1, 8, 9,
Scarabaeidae	<i>Labarrus lividus</i> (Olivier, 1789)	1, 2, 3, 4, 5, 9, 10,
Scarabaeidae	<i>Limarus maculatus</i> Sturm, 1830	1, 9,
Scarabaeidae	<i>Liothorax kraatzi</i> Harold, 1868	1, 2, 4,
Scarabaeidae	<i>Melinopterus consputus</i> Creutzer in Panzer, 1799	1, 2, 3, 4, 5, 7, 8, 9, 10,
Scarabaeidae	<i>Melinopterus prodromus</i> (Brahm, 1790)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Nialus varians</i> Duftschmid, 1805	1, 3, 4, 5, 9,
Scarabaeidae	<i>Nimbus contaminatus</i> (Herbst, 1793)	1, 5, 10,
Scarabaeidae	<i>Nimbus obliteratus</i> Sturm, 1823	5,
Scarabaeidae	<i>Nobius serotinus</i> (Creutzer, in Panzer, 1799)	1, 2, 4, 10
Scarabaeidae	<i>Otophorus haemorrhoidalis</i> (Linnaeus, 1758)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Oxyomus sylvestris</i> (Scopoli, 1763)	1, 2, 3, 4, 5, 7, 8, 9, 10,
Scarabaeidae	<i>Phalacrocnathus biguttatus</i> Germar, 1824	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,
Scarabaeidae	<i>Plagiogonus arenarius</i> (Olivier, 1789)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,

Scarabaeidae	<i>Planolinoides borealis</i> Gyllenhal, 1827	1, 7, 8, 9,
Scarabaeidae	<i>Planolinus fasciatus</i> (Olivier, 1789)	1, 5, 7, 8, 9, 10,
Scarabaeidae	<i>Rhodaphodius foetens</i> (Fabricius, 1787)	1, 2, 3, 4, 5, 9, 10,
Scarabaeidae	<i>Sigorus porcus</i> (Fabricius, 1792)	1, 2, 3, 4, 5, 9, 10,
Scarabaeidae	<i>Subrinus sturmi</i> Harold in L. Heyden, 1870	1, 2, 3, 4, 5, 6, 8, 9, 10,
Scarabaeidae	<i>Teuchestes fossor</i> (Linnaeus, 1758)	1, 2, 3, 4, 5, 10,
Scarabaeidae	<i>Trichonotulus scrofa</i> (Fabricius, 1787)	1, 5, 6, 7, 8, 9, 10,
Scarabaeidae	<i>Volinus sticticus</i> (Panzer, 1798)	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
Scarabaeidae	<i>Diastictus vulneratus</i> (Sturm, 1805)	5, 7, 8, 9, 10,
Scarabaeidae	<i>Pleurophorus caesus</i> (Creutzer in Panzer, 1796)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Rhyssemus germanus</i> (Linnaeus, 1767)	1, 4, 5, 8, 9, 10,
Scarabaeidae	<i>Copris lunaris</i> (Linnaeus, 1758)	1, 2, 3, 4, 5, 10,
Scarabaeidae	<i>Gymnopleurus mopsis mopsis</i> (Pallas, 1781)	5
Scarabaeidae	<i>Euoniticellus fulvus</i> (Goeze, 1777)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Caccobius schreberi</i> (Linnaeus, 1767)	1, 2, 3, 4, 5, 6, 10,
Scarabaeidae	<i>Euonthophagus amyntas alces</i> (Fabricius, 1792)	1, 2, 4, 5, 10,
Scarabaeidae	<i>Onthophagus furcatus</i> (Fabricius, 1781)	5, 6,
Scarabaeidae	<i>Onthophagus illyricus</i> (Scopoli, 1763)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Onthophagus taurus</i> (Schreber, 1759)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Onthophagus coenobita</i> (Herbst, 1783)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Onthophagus fracticornis</i> (Preyßler, 1790)	1, 2, 3, 4, 5, 7, 8, 10, 11
Scarabaeidae	<i>Onthophagus grossepunctatus</i> Reitter, 1905	1
Scarabaeidae	<i>Onthophagus joannae</i> Goljan, 1953	1, 2, 3, 4, 5, 6, 7, 8, 9, 10,
Scarabaeidae	<i>Onthophagus lemur</i> (Fabricius, 1781)	1, 5, 7, 8, 9, 10,
Scarabaeidae	<i>Onthophagus medius</i> (Kugelann, 1792)	1, 2, 3, 4, 5, 10, 11
Scarabaeidae	<i>Onthophagus nuchicornis</i> (Linnaeus, 1758)	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
Scarabaeidae	<i>Onthophagus ovatus</i> (Linnaeus, 1767)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Onthophagus ruficapillus</i> Brullé, 1832	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Scarabaeidae	<i>Onthophagus semicornis</i> (Panzer, 1798)	1, 4, 5, 7, 8, 9, 10,
Scarabaeidae	<i>Onthophagus similis</i> (L. G. Scriba, 1790)	1, 5, 7, 8, 9,
Scarabaeidae	<i>Onthophagus vacca</i> (Linnaeus, 1767)	1, 2, 3, 4, 5, 10, 11
Scarabaeidae	<i>Onthophagus verticicornis</i> (Laicharting, 1781)	1, 2, 3, 4, 5, 7, 8, 9, 10,
Scarabaeidae	<i>Sisyphus schaefferi schaefferi</i> (Linnaeus, 1758)	4, 7, 8, 10,

Lokalita: 1 – Velkolélsky ostrov, 2 – Paveľské slanisko, 3 – Mostová, 4 – Kamenínske slanisko, 5 – Virt, 6 – Marcelová, 7 – Kršlenica, 8 – Devínska Kobyla, 9 – Biskupické lúhy – Kopáč, 10 – Modrý vrch, 11 – Akomáň

<b>SKUPINA A</b>	Druhy označené touto farbou predstavujú indikačne najvýznamnejšie druhy. Ich výskyt je na Slovensku vzácny a vyskytujú sa iba na zachovalých pasienkoch a biotopoch, druhy sú veľmi citlivé na používanie antiparazitík.
<b>SKUPINA B</b>	Indikačne významné druhy, citlivé na používanie antiparazitík. Na mnohých lokalitách pri častom a nevhodnom používaní antiparazitík úplne chýbajú.
	Bežnejšie druhy so širokým areálom rozšírenia na rôznych biotopoch, antiparazitiká ich početnosť znižujú





**Obr. č. 1. Graf znázorňujúci druhovú diverzitu koprofágov na jednotlivých lokalitách a pomer zastúpenia indikačne významných skupín vzácnych a ohrozených koprofágov.**

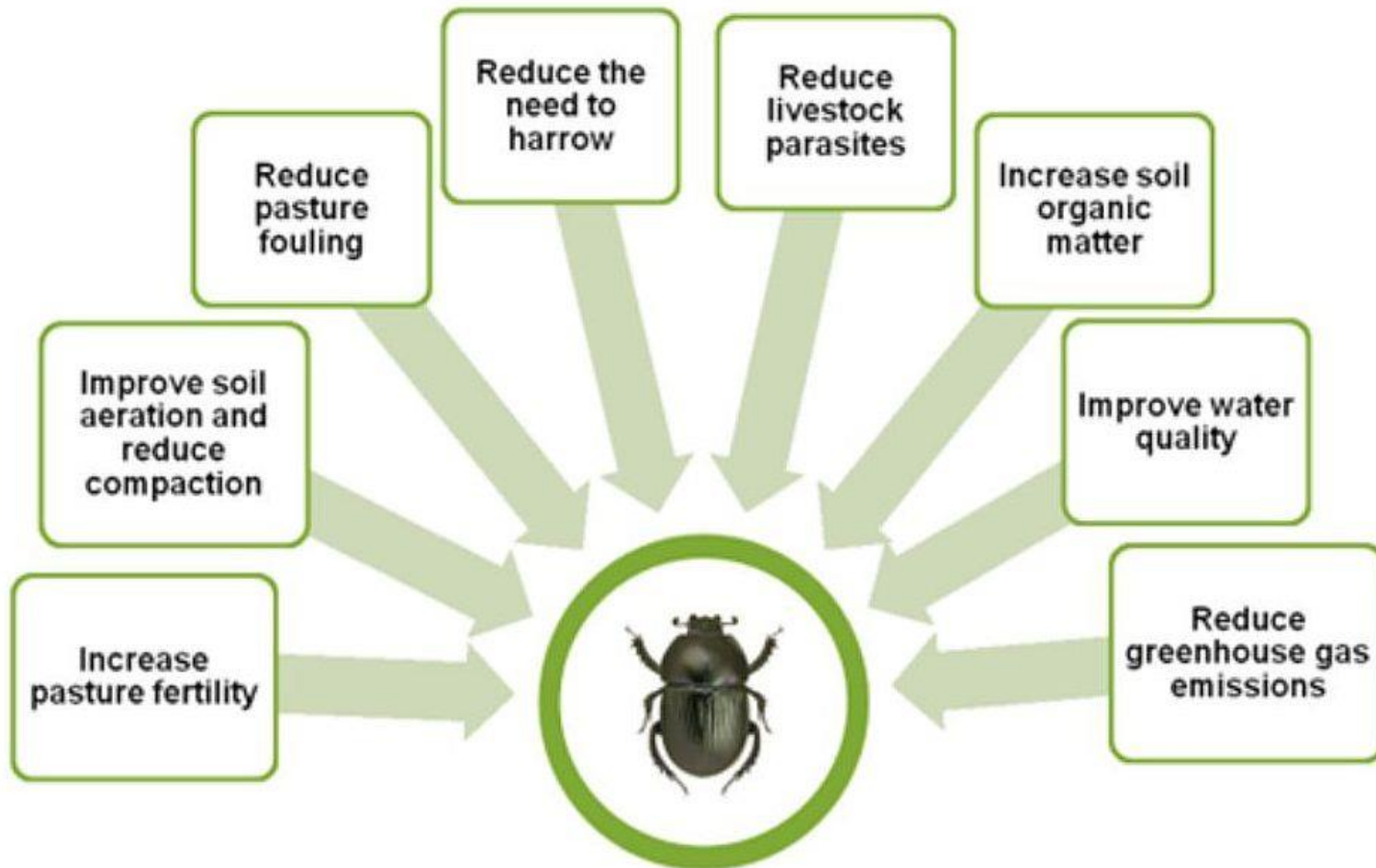
Z 11 skúmaných lokalít mimoriadnou druhovou pestrosťou koprofágnych druhov chrobákov vynikajú 3 lokality. Najbohatšou je Veľkolélsky ostrov, kde bolo zistených až 64 druhov, potom nasleduje lokalita Virt (61 zistených druhov) a následne Modrý vrch (58 zistených druhov).

Celkovo sa na skúmaných lokalitách preukázal výskyt až 72 druhov koprofágnych chrobákov z čeľadí Scarabaeidae a Geotrupidae.

Zo zistených druhov sa vyčlenili dve ekologické skupiny najohrozenejších druhov koprofágov:

- EKOLOGICKÁ SKUPINA A - 12 druhov (16,6% z celkového počtu zistených druhov)
- EKOLOGICKÁ SKUPINA B - 33 druhov (45,8% z celkového počtu zistených druhov)

Získané dáta sa následne budú využívať pri ekologickom hodnotení pasienkov a zároveň pri tvorbe červeného zoznamu koprofágnych druhov chrobákov Slovenska.



Dung Beetles Direct (2015)

**Ďakujem za pozornosť!**

