| Hypothesis | Response variable(s) | Explanatory variable (Effect) | Mechanism(s) | Examples of supporting literature | Results |
|---|---|---|---|---|---|
| **(1) Anthropogenic pressures** | | | | | |
| Human disturbances extirpate species richness | $S_I$, $S_P$, $S_{tot}$ | HII (-) | Habitat destruction/degradation<br>Agrochemical pollution | Aguilar *et al.* 2006; Ricketts *et al.* 2008; Winfree *et al.* 2009; Brittain *et al.* 2010; Burkle *et al.* 2013; Weiner *et al.* 2014 | Not detected |
| Human disturbances promote species richness | $S_I$, $S_P$, $S_{tot}$ | HII (+) | Landscape heterogeneity<br>Invasion of alien species | Aizen 2007, 2008; Winfree *et al.* 2007, 2008; Carré *et al.* 2009; Stouffer *et al.* 2014; Vanbergen *et al.* 2017; Wenzel *et al.* , 2020 | Not detected |
| Human distrubances favor generalist species | C, $L_I$, $L_P$ | HII (+) | Specialization-disturbance Theory (Vazquez & Simberloff 2002)<br>"Spreading the risk" (Den Boer 1968)<br>Secondary extinction cascades (Dunne 2002a; Memmott *et al.* 2004)<br>Super-generalists invasion (*sensu* Olesen *et al.* 2002) | Biesmeijer *et al.* 2006; Steffan-Dewenter *et al.* 2006; Aizen *et al.* 2008; Aizen *et al.* 2012; Burkle *et al.* 2013; Spiesman & Inoue, 2013; Albrecht *et al.* 2014; Stouffer *et al.* 2014; Weiner *et al.* 2014; Tylianakis & Morris 2017; Redhead *et al.* 2018 | **Detected** for complete networks and Hymenoptera, not Diptera |
| **(2) Climate effects** | | | | | |
| Water and energy availability promote plant richness | $S_P$ | $P_{tot}$ (+)<br>$T_{mean}$ (+) | Species-Energy theory (Wright, 1983)<br>Water–energy dynamics hypothesis (Hawkins *et al.* , 2003) | Francis & Currie, 2003; Pausas & Austin, 2001; Kreft & Jetz, 2007 | Not detected |
| Pollinators tend to favor hot and dry environment | $S_I$, $S_{tot}$ | $P_{tot}$ (-)<br>$T_{mean}$ (+) | Poor flying conditions under rainfall (Cruden 1972)<br>Metabolic activity (Turner *et al.* 1987) | Arroyo *et al.* 1982; Wolda 1987; Devoto *et al.* 2005; Martin Gonzalez *et al.* 2009 | **Opposite results** $T_{mean}$ (-) on $S_I$, $S_{tot}$ |
| Productive environments favor specialization | C, $L_I$ | $P_{tot}$ (-)<br>$T_{mean}$ (-) | Resources abundance and Optimal Foraging Theory (MacArthur & Pianka 1966) | Dalgaard *et al.* 2013; Takemoto *et al.* 2014; Takemoto & Kajihara 2016<br>Petanidou *et al.* 2018 | Not detected |
| Diverse environments favor generalism | C, $L_I$ | $P_{tot}$ (+)<br>$T_{mean}$ (+) | Resources dilution and Optimal Foraging Theory (MacArthur & Pianka 1966) | Schleuning *et al.* 2012 | Not detected |
| Climate seasonality limits species richness | $S_I$, $S_P$, $S_{tot}$ | $P_{var}$ (-)<br>$T_{var}$ (-) | Unfavorableness of unstable environments (Brown 1988)<br>Diversity-stability (Pianka 1966) | Arroyo *et al.* 1982 | **Detected** only for $P_{var}$ on $S_I$ for Diptera |
| Climate seasonality promotes species richness | $S_I$, $S_P$, $S_{tot}$ | $P_{var}$ (+)<br>$T_{var}$ (+) | Climatic niche diversity | Petanidou *et al.* 2018; Takemoto *et al.* 2014 | **Detected** only for $T_{var}$ on $S_I$ for Hymenoptera |
| Climate seasonality favors generalist species | C, $L_I$, $L_P$ | $P_{var}$ (+)<br>$T_{var}$ (+) | Optimal Foraging Theory under fluctuating environment (May & MacArthur 1972)<br>Diversity-stability (Pianka 1966) | Arroyo *et al.* 1982; Devoto *et al.* 2005; Dalsgaard *et al.* 2017 | Not detected |
| Climate seasonality increases phenological mismatches | C, $L_I$, $L_P$ | $P_{var}$ (-)<br>$T_{var}$ (-) | Forbidden links (*sensu* Olesen *et al.* 2011) | Vazquez *et al.* 2009; CaraDonna *et al.* 2017; Petadinou *et al.* 2018; Takemoto *et al.* 2014 | Not detected |
| **(3) Sampling effects** | | | | | |
| Connectance decreases with network size | C | Network size = $S_{tot}$ (-) | Link-species scaling law (Cohen *et al.* 1990; Winemiller *et al.* 2001) | Jordano 1987; Olesen & Jordano 2002; Thébault & Fontaine 2010 | **Detected** |
| Link density of species increases with available partners | $L_I$, $L_P$ | Partner pool = $S_I$ or $S_P$ (+) | More potential partners allow more interactions (Relative specialization: Armbruster 2017) | | **Detected** |
| Sampling effort inflates the number of interactions & species recorded | C, $L_I$, $L_P$, $S_{tot}$, $S_P$, $S_I$ | SE (+) or stdSE (+) | Completness of the survey (Blütghen *et al.* 2008; Dormann *et al.* 2009; Rivera-Hutinel et al. 2012) | Ollerton & Cranmer 2002; Chacoff et al. 2012; Vizentin-Bugoni *et al.* 2014; Traveset *et al.* 2016; Dalsgaard *et al.* 2017; Zanata *et al.* 2017 | **Detected** |
| Richness increases with temporal extent | $S_{tot}$, $S_P$, $S_I$ | ATS (+) | Completness of the survey | Sajjad *et al.* 2017; Schwarz et al. 2020 | **Detected** |
| Connectance decreases with temporal extent | C, $L_I$, $L_P$ | ATS (-) | Increase of forbidden links (*sensu* Olesen *et al.* 2011) | Sajjad et al. 2017; Schwarz et al. 2020 | **Detected** |
| T-O sampling decreases richness detection | $S_{tot}$, $S_P$, $S_I$ | Sampling method (-) [a] | Completness of survey | | **Detected** |
| T-O sampling increases interaction detection | C, $L_I$, $L_P$ | Sampling method (+) [a] | Evenness of observation effort allocated among plant species | Gibson *et al.* 2011 | **Detected** |
| Low taxonomic resolution hides real richness | $S_{tot}$, $S_I$, $S_P$ | Taxonomic resolution (+) | Lumping of species in morphospecies | | **Opposite results** Taxo (-) on $S_{tot}$ and $S_I$ |
| Low taxonomic resolution inflates generalism | C, $L_I$, $L_P$ | Taxonomic resolution (-) | Merging species partner pools | Renaud *et al.* 2020 | Not detected |