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Title: Global change effects on plant communities are magnified by time and the number of global change factors imposed

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Abstract: Global change drivers (GCDs) are expected to alter community structure and consequently the services ecosystems provide. Yet few experimental investigations have examined effects of GCDs on plant community structure across multiple ecosystem types, and those that do exist present conflicting patterns. In an unprecedented global synthesis of over 100 experiments that manipulated factors linked to GCDs, we show that herbaceous plant community responses depend on experimental manipulation length and number of factors manipulated. We found that plant communities are fairly resistant to experimentally manipulated GCDs in the short-term (<10 years). In contrast, long-term ($\geq$10 year) experiments show increasing community divergence of treatments from control conditions. Surprisingly, these community responses occurred with similar frequency across GCD types manipulated in our database. However, community responses were more common when three or more GCDs were simultaneously manipulated, suggesting the emergence of additive or synergistic effects of multiple drivers, particularly over long-time periods. In half of the cases, GCD manipulations caused a difference in community composition without a corresponding species richness difference, indicating that species reordering or replacement is an important mechanism of community responses to GCDs and should be given greater consideration when examining consequences of GCDs for the biodiversity-ecosystem function relationship. Human activities are currently driving unparalleled global changes worldwide. Our analyses provide the most comprehensive evidence to-date that these human activities may have widespread impacts on plant community composition globally, which will increase in frequency over time and be greater in areas where communities face multiple GCDs simultaneously.

Keywords: community composition, global change experiments, herbaceous plants, species

160   richness

161

162   **Significance Statement:** Accurate prediction of community responses to global change drivers

163   (GCDs) is critical, given the effects of biodiversity on ecosystem services. There is consensus

164   that human activities are driving species extinctions at the global scale, but debate remains over

165   whether GCDs are systematically altering local communities worldwide. Across 105

166   experiments that included over 400 experimental manipulations, we found evidence for a lagged

167   response of herbaceous plant communities to GCDs, caused by shifts in the identities and

168   relative abundances of species often without a corresponding difference in species richness.

169   These results provide evidence that community responses are pervasive across a wide variety of

170   GCDs on long-term temporal scales, and that these responses increase in strength when multiple

171   GCDs are simultaneously imposed.

172   /body

173   **Main Text:**

174   Human activities are driving unprecedented changes in many factors that may affect the

175   composition and functioning of plant communities. Determining the factors that cause alterations in

176   plant community structure is critical, as important ecosystem functions and services are influenced

177   by plant community composition (1, 2). Changes in resource availability (*e.g.*, atmospheric carbon

178   dioxide (CO_2), nitrogen (N), precipitation patterns) may have large consequences for plant

179   community structure worldwide (3). Yet our ability to interpret and predict plant community

180   responses to global change is complicated by many factors, such as the type of global change

181   driver (GCD) and the environmental context. Observational and experimental evidence has

182   demonstrated disparate and seemingly conflicting patterns of species richness responses to

183   environmental change across a variety of independent studies, meta-analyses, and large data

184   syntheses (4–11). As such, there is continued debate over whether local-scale biodiversity loss is

185   a worldwide trend (12–14). Moreover, recent studies (15, 16) advocate the use of multivariate

186   metrics (*e.g.*, Bray-Curtis dissimilarity) that account not only for changes in species number, but

187   also species identities and relative abundances to provide a more comprehensive picture of

188   composition responses to GCDs.

189   Both biotic (*e.g.*, shifts in competitive dominance or susceptibility to herbivores) and

190   abiotic (*e.g.*, environmental filtering) processes (17–19) have been invoked to explain how

191   GCDs affect plant community richness and composition at local scales, and it seems reasonable

192   to expect that plant community responses will vary across a broad array of GCDs (2, 15).

193   Resource additions (*e.g.*, nutrient additions) are predicted to reduce plant species richness and

194   alter plant community composition due to changes in competitive interactions among species for

195   the remaining limiting resources (*e.g.*, water or light) (7, 8, 20). In contrast, increased

196 environmental stress may have varying effects on plant community composition by either

197 shifting or increasing niche availability. For example, repeated removal of plant material through

198 haying (a common land use change in many herbaceous systems) may increase species richness

199 by increasing light availability and favoring species that can tolerate removal of aboveground

200 material. In contrast, increased drought or temperature stress may decrease plant species richness

201 as many species may not be able to persist under these novel conditions (7, 21). In addition to the

202 type of driver manipulated, the number of simultaneously imposed GCDs may also impact

203 community responses. Previous studies have shown that plant community responses may be

204 greater under multiple simultaneously imposed GCDs (22–24). In contrast, both empirical and

205 theoretical evidence suggests that ecosystem function responses have been shown to dampen

206 with increasing numbers of simultaneously imposed GCDs (25, 26), due to a canceling out of

207 positive and negative effects on functions such as productivity and nutrient cycling. Based on

208 these conflicting results, determining a generalizable pattern of the effects of multiple GCDs on

209 community responses is needed.

210 Here we examined results from 105 experiments conducted in grasslands around the

211 world that together provide data on over 400 experimental manipulations of GCDs to determine

212 whether we could identify general community response patterns across different types of

213 manipulations, the magnitude of the manipulations imposed, or the attributes of the ecosystems

214 where the experiments were conducted. In contrast to prior analyses, which have examined

215 patterns of community change based on observational data (5, 16, 27), we focused on

216 experiments because they provide an important baseline (control plots) that is critical for the

217 accurate assessment of community responses to GCDs by separating stochastic community shifts

218 from global change effects. By identifying generalities where they exist across complex

219   community patterns, we can make tangible progress toward prediction of future community

220   responses to GCDs occurring worldwide, which is needed to develop strategies for maintaining

221   the communities upon which many ecosystem services rely.

222   We used hierarchical Bayesian modeling to examine how herbaceous plant communities

223   responded to global change manipulations in 438 experimental treatments, encompassed within

224   105 experiments at 52 sites around the world using the Community Responses to Resource

225   Experiments [CoRRE] database (https://corredata.weebly.com/; see SI Appendix 2). The CoRRE

226   database was assembled from plant species composition data collected by hundreds of

227   researchers in field experiments across all continents except Antarctica, and includes 285,019

228   species occurrence records of 2843 species from 26,788 time points in experiments ranging in

229   duration from 3 to 31 years (Table 1; see SI Appendix 3). Global change treatments included

230   resource additions and removals (*e.g.*, nutrient additions, increased atmospheric CO_2, irrigation,

231   drought), as well as non-resource manipulations (*e.g.*, increased temperature, burning, mowing,

232   herbivore removals), and were designed to simulate predicted future global change scenarios in

233   different areas of the globe. We measured plant community responses in treatments relative to

234   controls using two commonly used metrics of community difference: (1) ln Response Ratios

235   (lnRR) of plant species richness (*i.e.*, species number without regard to identity) and (2) species

236   composition responses in multivariate space using Bray-Curtis dissimilarities (encompassing

237   shifts in plant species identities and their relative abundances). We also briefly present results

238   from two additional richness metrics: percent difference of plant species richness from control to

239   treatment plots and lnRR of effective species number (e^H). Because these two metrics show

240   qualitatively identical results to lnRR of richness, we focus on lnRR of richness here for most

241   analyses. For all metrics, we investigated the temporal nature of the observed differences over

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242   the length of each experiment, as well as whether these effects varied based on the site-level

243   (gamma) diversity or productivity of each experiment.

244   In experiments less than 10 years in duration, we found that plant communities are

245   relatively resistant to global change manipulations, with 79.5% and 77.0% of treatments showing

246   no richness or composition response, respectively (Table 2; Fig. 1a,f). In contrast in long-term

247   ($\geq$10 years) experiments, fewer manipulations (50%) showed no difference in species richness

248   (Table 2). Importantly, 70.7% of long-term manipulations exhibited composition responses

249   (Table 2) and some communities experienced almost complete turnover after one to two decades

250   (composition responses close to 1.0; Fig. 1). The increased prevalence of community responses

251   in long-term experiments highlights the need for long-term data collection to better identify

252   community responses to GCDs. In approximately half of the cases (54.5%) where experimental

253   manipulations caused a composition shift through time, it occurred without a corresponding

254   richness response. Consequently, the multivariate plant community composition responses

255   observed here often reflect differences in species evenness, reordering of species ranks based on

256   relative abundances, or species replacement (turnover) (15). Future consideration of these

257   detailed community responses is warranted to (1) examine the temporal hierarchy of the response

258   (*i.e.*, is there an ordering to differences in evenness, reordering of species ranks, and turnover)

259   (2), and (2) move beyond using only richness differences as a metric of biodiversity (16).

260   Studying these detailed community shifts will provide important insight into how alterations in

261   ecosystem function with GCDs relate to compositional aspects of biodiversity.

262   When considering all manipulations regardless of experiment length, we find that the

263   community responses to global change manipulations varied in both direction and magnitude

264   (Fig. 1). When richness responded to experimental manipulations (22.3% of all manipulations), it

265 generally declined either linearly or asymptotically (Table 2; Fig. 1). Similarly, when

266 composition responded to experimental manipulations (35.6% of all manipulations), it generally

267 increased in dissimilarity from control plots (Table 2; Fig. 1). Interestingly, in a small subset of

268 the cases studied here (10.5% of richness and 10.1% of composition responses), community

269 responses to global change manipulations were parabolic, with the minimum or maximum of the

270 curve occurring within the study period, suggesting that the community responses in these sites

271 dampen over time (Table 2; Fig. 1). These parabolic trends were more often detected in the long-

272 term experiments and treatments that manipulated two or more factors. For richness responses,

273 these parabolic trends were nearly equally split amongst those that were concave down,

274 indicative of initial richness losses that later recovered due to immigration of new species or

275 recovery of previously lost species, and those that were concave up, indicative of initial richness

276 gains that later declined. In contrast, the parabolic trends in composition response were nearly all

277 concave up, demonstrating an initial divergence of treatment and control plots, followed by

278 convergence. The few cases of long-term convergence between treatment and control plots

279 stemmed from a shift in control plots towards the altered state exhibited in the treatments (see SI

280 Appendix 5). Overall, these parabolic trends caused by a shift in communities in control plots

281 suggests that human activities may currently be impacting the environment at a scale beyond the

282 scope of some experimental treatments, as has previously been demonstrated in global

283 observational data syntheses (5, 8, 25).

284   Across sites, we found that productivity was positively related to richness increases in

285 response to global change manipulations, while gamma diversity (site-level species number) had

286 no effect on the direction or magnitude of the richness or composition responses (see SI

287 Appendix 4). Hence, high productivity ecosystems appear more responsive to GCDs, possibly

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288   due to the greater availability of resources and therefore niche space in such systems (28), or the

289   greater ability of species in these systems to respond to GCDs due to higher growth rates in

290   productive herbaceous systems (29). The greater community responsiveness at high productivity

291   sites may contribute to the maintenance of ecosystem function, as species with traits adapted to

292   the novel environmental conditions presented by global change scenarios increase in abundance

293   in these communities (30). However, higher abundances of species that are not functionally

294   similar to the existing community (2, 3, 5) would likely result in altered ecosystem function.

295   Declines in species richness are often attributed to decreased niche dimensionality with

296   alleviation of resource limitations (17) or increased environmental filtering (19), while richness

297   increases may be due to invasions or increased environmental heterogeneity (31). We did

298   observe richness differences in a few cases that may be attributable to these mechanisms. For

299   example, multiple resource additions may decrease niche dimensionality, leading to dominance

300   of a few competitive species and therefore richness declines (20). In contrast, multiple resource

301   additions can shift an ecosystem's stoichiometry to alter the relative availability of the most

302   limiting resource, and thus competitive interactions, thereby reducing species loss (32). Further,

303   resource additions may increase species invasions by relaxing environmental filters (33), again

304   reducing species loss. Nevertheless, in the majority of cases we found that global change

305   treatments altered community composition with no corresponding richness responses. These

306   results highlight the fact that, by not accounting for species identity species, richness does not

307   entirely capture community responses to GCDs (16). Indeed, species richness can stay constant

308   even with complete turnover in the identities of species within a community. Therefore,

309   multivariate metrics of species abundances are needed to assess complex community responses

310   to GCDs (15).

311   Interestingly, we did not find differences in richness or composition responses based on

312   the type of global change driver applied (Table 3). Our results differ from previous meta-

313   analyses that show stronger richness losses with N additions than other GCDs (7). However, we

314   did find that global change manipulations that simultaneously manipulated three or more GCDs

315   were significantly more likely to show richness and composition responses than treatments that

316   only manipulated one or two GCDs (Table 3; Fig. 3). These results are consistent with previous

317   studies examining community responses to GCDs (22–24), but contrast with trends observed for

318   ecosystem function responses to multiple GCDs from two previous studies, which tend to show

319   damped responses with increasing factors manipulated (25, 26). This difference highlights the

320   need to examine how differences in community composition relate to altered ecosystem function

321   (2, 15, 25).

322   While on average the effects of N addition on plant communities were not stronger than

323   other global change treatments, we did find that the absolute level of N added interacted with

324   mean annual precipitation (MAP) to influence richness responses (Fig. 4; see SI Appendix 6).

325   Specifically, richness declined with increasing N added at sites with low MAP, and increased

326   with increasing N added at sites with high MAP (Fig. 4a; see SI Appendix 6). In contrast, the

327   magnitude of rainfall manipulations did not affect the richness or composition responses (Fig. 4;

328   see SI Appendix 6). These results conflict with previous analyses of richness responses to N

329   deposition, which show a decline in richness with increasing precipitation and N deposition (34).

330   This discrepancy may be due to the high magnitude of N added in some of our experiments,

331   more akin to nutrient runoff from agricultural fields than atmospheric deposition. Together, these

332   results point towards co-limitation of species richness across ecosystems (34, 35), and highlight

333   the need to address potential threshold responses of community responses to resource

334   manipulations.

335   Although this analysis includes the effects of a wide variety of global change

336   manipulations on plant communities, many combinations of GCDs potentially important to

337   global change were under-represented or missing from our analysis, reflective of their lack of

338   study worldwide. These include combinations that are posited to have large impacts on the

339   biosphere, such as the combined consequences of increased nutrient availability and altered

340   precipitation patterns (36). Further, the geographic scope of global change experiments is

341   primarily constrained to the northern hemisphere (see SI Appendix 3). Experiments that

342   incorporate higher order interactions at sites worldwide are critical for accurately predicting how

343   communities will respond globally to predicted GCDs (25). Despite these limitations, our results

344   clearly demonstrate that changes in plant community composition may be expected across a wide

345   range of GCDs over the coming decades.

346   In conclusion, our comprehensive analysis finds that plant community structure is

347   frequently altered by a broad array of GCDs, and that these effects are largely only detectable

348   over long (≥10 year) time scales. These community responses occurred at similar frequencies

349   across the wide variety of GCDs examined in this study, but were more prevalent when three or

350   more GCDs were manipulated simultaneously, representative of real-world situations where one

351   GCD rarely operates in isolation. In about half of the cases where compositional responses were

352   observed, they occurred without corresponding differences in species richness, indicating that

353   coexistence mechanisms may be maintained in the face of changing environmental conditions, or

354   that competitive displacement is slower than the time scales of these experiments. Rather than

355   species gains or losses, in many cases community responses appear to be due to the abundances

356   of species tracking environmental conditions through reordering within the existing community

357   or colonization from a regional species pool. Determining the functional consequences of these

358   broad-scale community responses to GCDs demands investigation into the identities and traits of

359   species that are most responsive to global environmental change (2, 37).

Author contributions: Author contributions are listed in SI Appendix 1 of the supplementary

material. Briefly, KJK and MLA concieved of the research in discussion with NPL, FI, EG,

GRH, SEK, DSJ, and KRW. All co-authors but two provided data used in analyses. Analyses

were conducted by KJK, MLA, NPL, FI, and ER. KJK wrote the manuscript, with input from all

co-authors.

List of Supplementary Material

Materials and Methods

Appendix 1 – Table of coauthor contributions.

Appendix 2 – Table of experiment information.

Appendix 3 – Map of experiment locations.

Appendix 4 – Experiment-level predictors of richness and composition responses.

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474

Figure Legends

476 Figure 1. Experimental global change manipulations drive temporal differences in plant

477 community composition. Richness responses (a-e) are measured as the ln Response Ratio (lnRR)

478 in richness between treatment and control plots within a year; positive values indicate net species

479 gains in treatment plots relative to control plots, while negative values indicate net species losses.

480 lnRR richness response has a lower bound of -1 and no upper bound. Composition responses (f-j)

481 are measured as the Euclidean distance between centroids of control and treatment plots within a

482 year in a PCoA based on a Bray-Curtis dissimilarity matrix; composition response is bounded by

483 0 and 1. Responses are grouped among five possible shapes, indicated along the left-side of the

484 panels. For all panels, lines correspond to models for 438 individual global change treatments

485 responses across 105 experiments. For all lines, slopes and intercepts are plotted as zero when

486 95% credible intervals (CI) of parameters include zero. Values in parentheses are percentages of

487 studies exhibiting a particular response shape across all experiments (*i.e.*, not considering

488 experiment length). Percentage responses for short-term vs long-term experiments can be found

489 in Table 2.

490

491 Figure 2: Across all datasets, the proportion of significant temporal plant community responses

492 (lnRR richness and composition differences) to global change treatments do not vary by the type

493 of global change manipulation imposed. Single-factor global change manipulations are

494 categorized into treatment types (CO2=increased atmospheric CO2; drought=reduced

495 precipitation; irrigation=increased precipitation; precip. vari.=variation in precipitation timing,

496 but not amount; nitrogen=nitrogen additions; phosphorus=phosphorous additions;

497 temperature=increased temperature; mow=mowing aboveground biomass; herbivore

498   rem.=removal of above- and/or below-ground herbivores; plant manip.=one time manipulation

499   of plant community through seed additions or diversity treatments at the start of the experiment).

500

501   Figure 3: Across all datasets, the proportion of significant temporal plant community responses

502   (lnRR richness and composition differences) to global change treatments vary by the number of

503   treatments simultaneously imposed. Global change manipulations are categorized into treatment

504   categories (R=single resource; N=single non-resource; R*R=two-way interactions with both

505   treatments manipulating resources; N*N=two-way interactions with both treatments

506   manipulating non-resources; R*N=two-way interactions with one resource and one non-resource

507   manipulation; R*R*R=three or more way interactions with all treatments manipulating

508   resources; and 3+=three or more way interactions with both resource and non-resource

509   manipulations). Significant differences in the proportion of significant richness and composition

510   responses among treatment categories are indicated by letters as determined by Fisher's exact

511   test for all pairwise combinations.

512

513   Figure 4: Differences in (a-c) richness and (d-f) plant composition to the magnitude of (a, d)

514   nitrogen (N) addition treatments, (b, e) drought manipulation treatments, and (c, f) irrigation

515   manipulation experiments. Points represent treatment responses for each experiment at each site

516   in the final year of treatment, and lines indicate Bayesian regressions between treatment

517   magnitude and richness or composition responses where significant. Points and lines are colored

518   by site-level mean annual precipitation (MAP) where the independent effect of MAP was

519   significant, and lines are colored by MAP where the interactive effect between MAP and
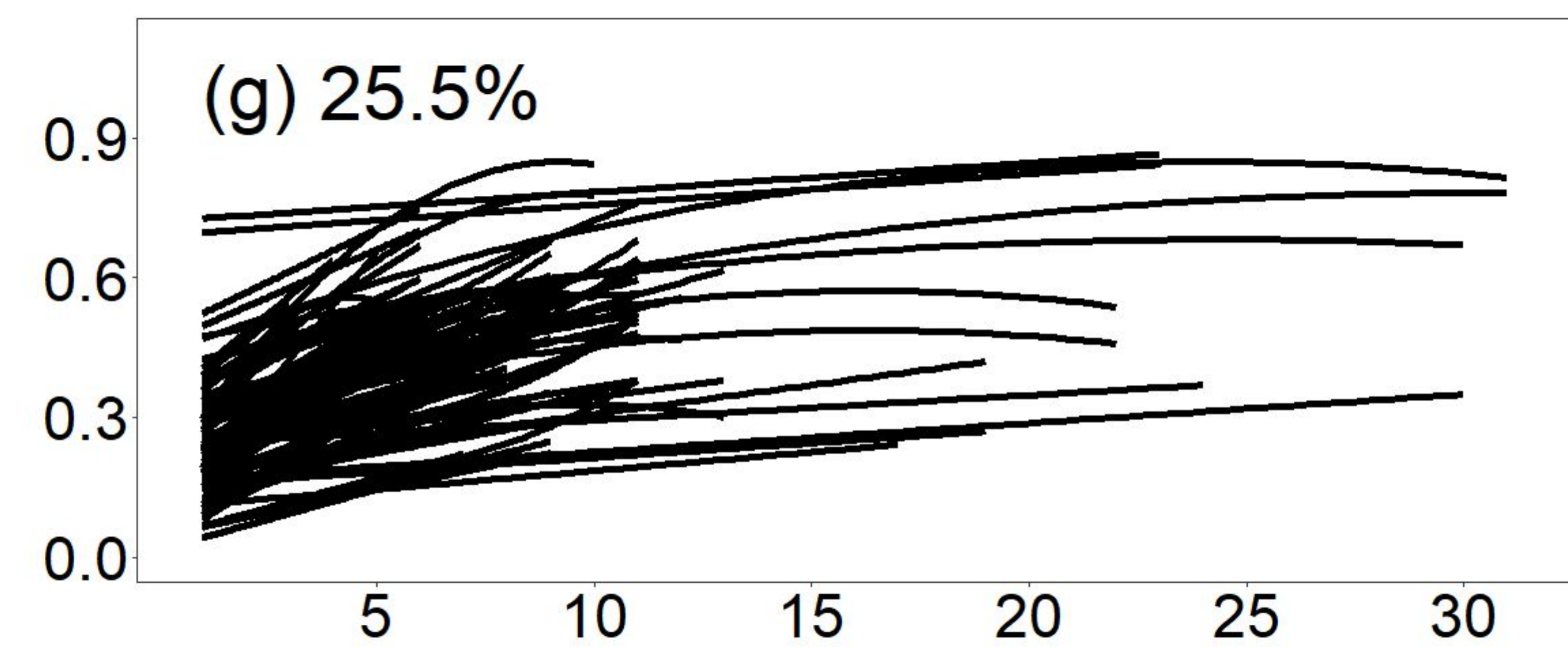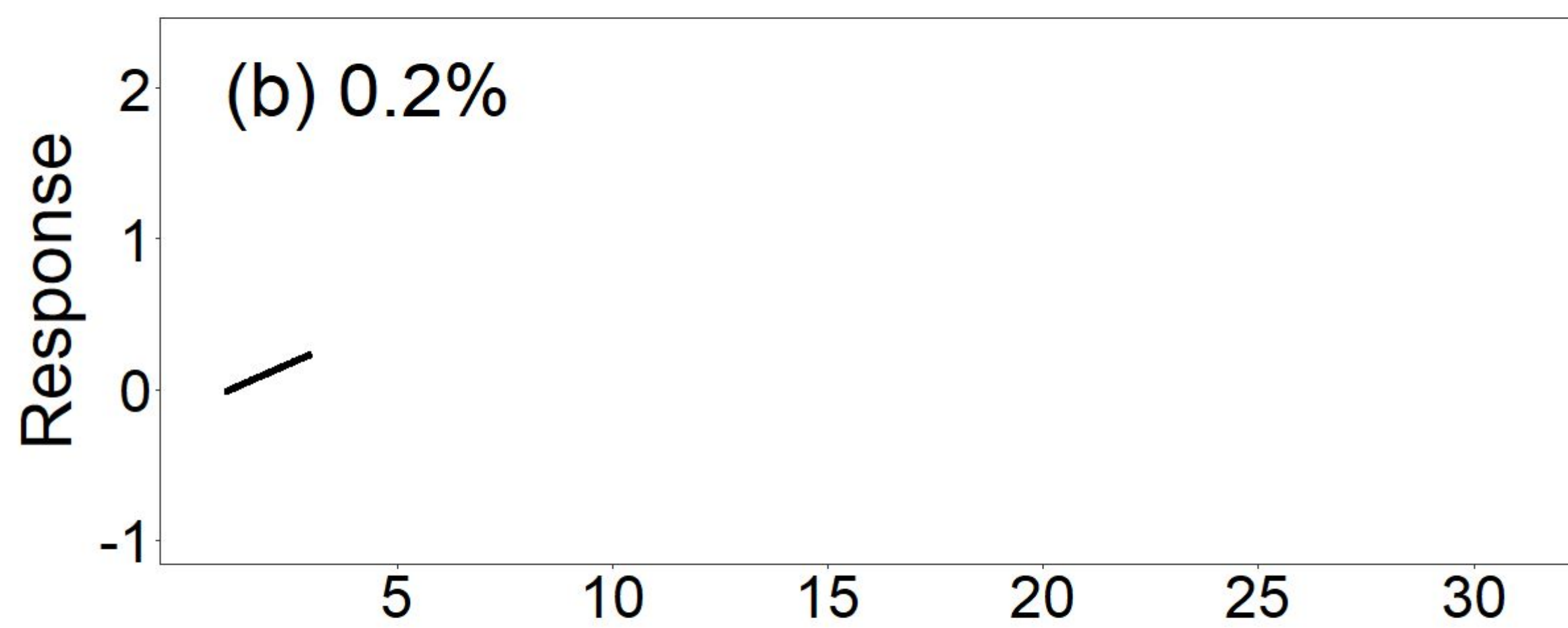
520   treatment magnitude was significant.
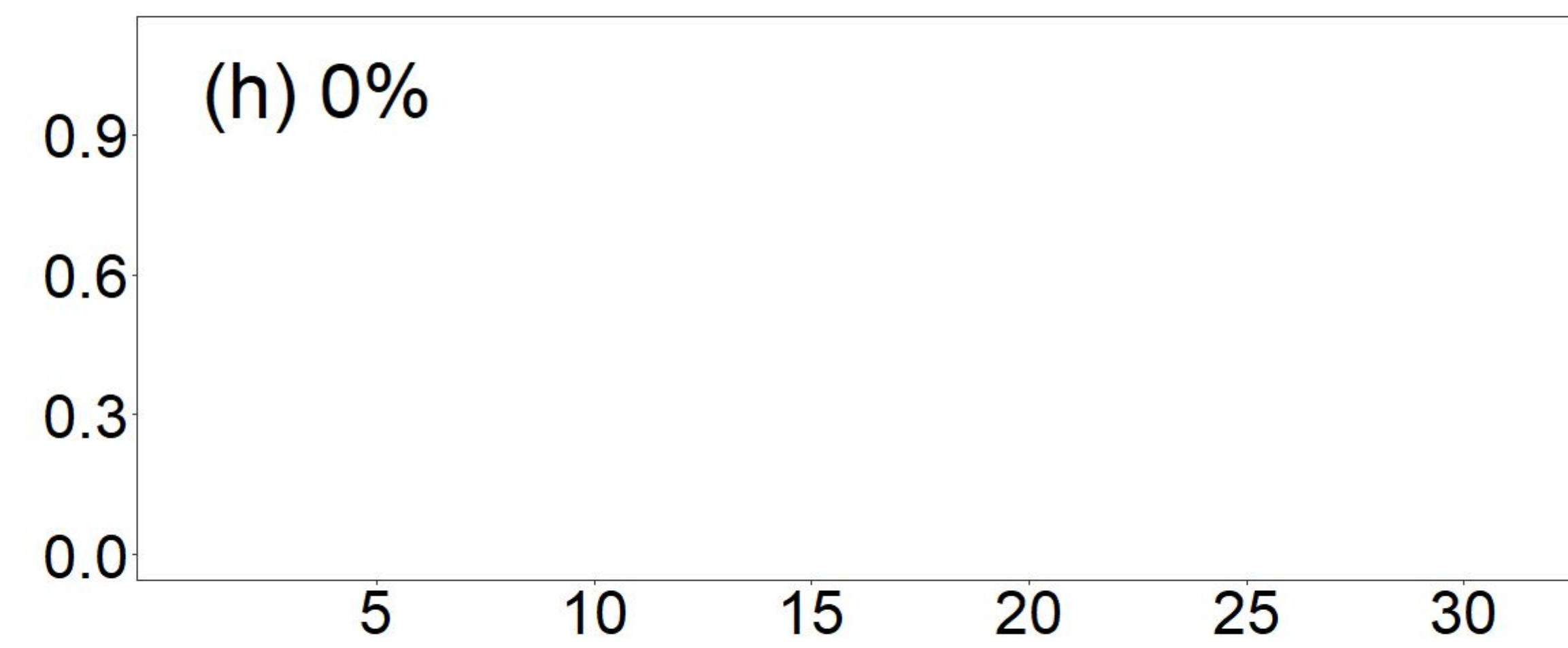
Column headers: **lnRR Richness Response** | **Composition Response**
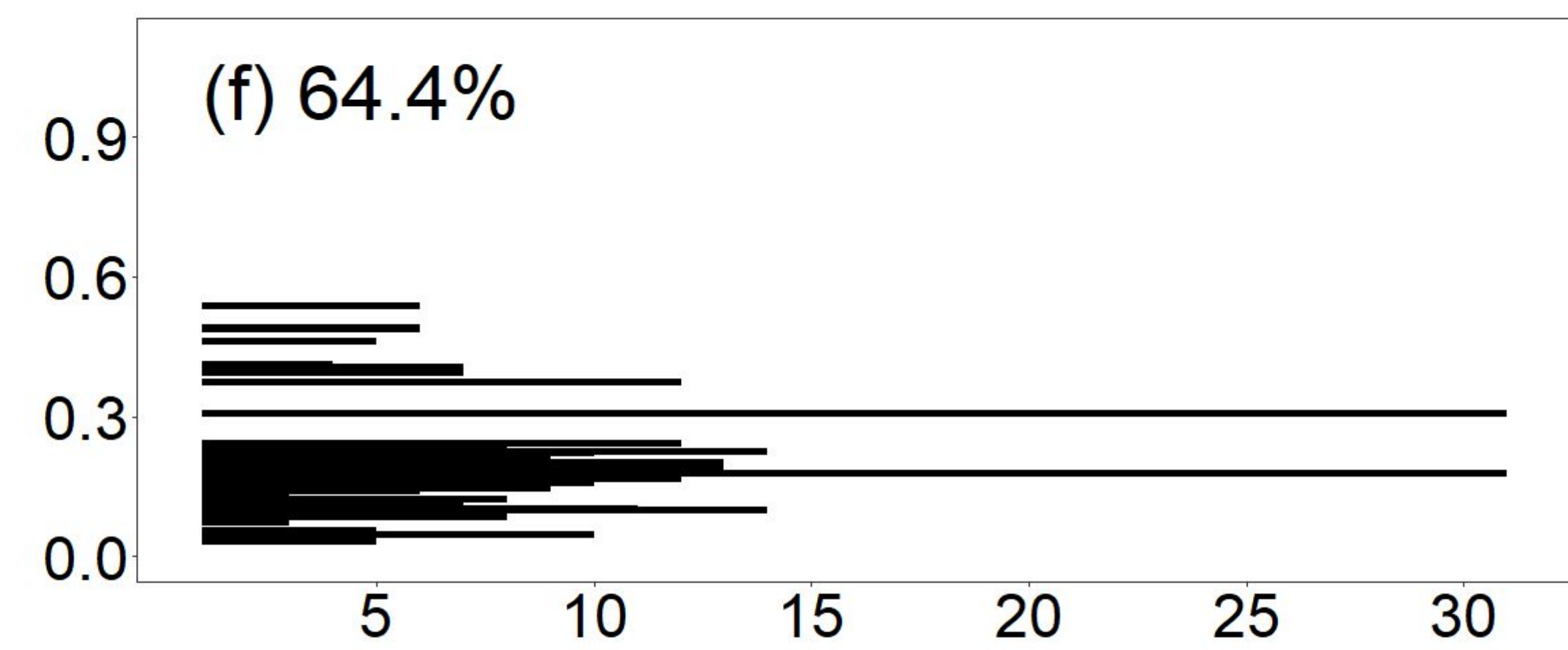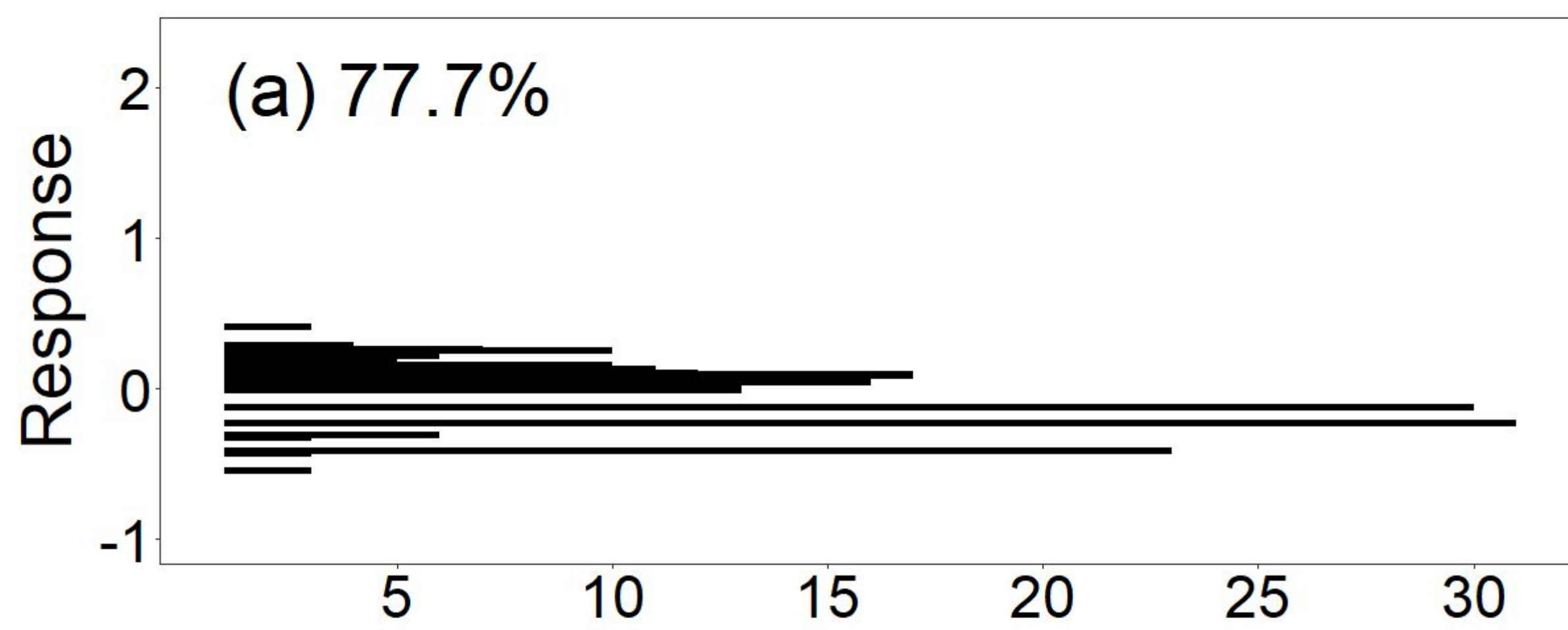
Row labels (left to right): no response, increase, decrease, concave down, concave up

(a) 77.7% (f) 64.4%
(b) 0.2%   (g) 25.5%
(c) 12.3% (h) 0%
(d) 5.0%   (i) 9.6%
(e) 5.5%   (j) 0.5%

Y-axis label: Response

X-axis label: Year of Treatment

(a) Richness Response

(b) Composition Response

(a) Richness Response · **(b) Composition Response**
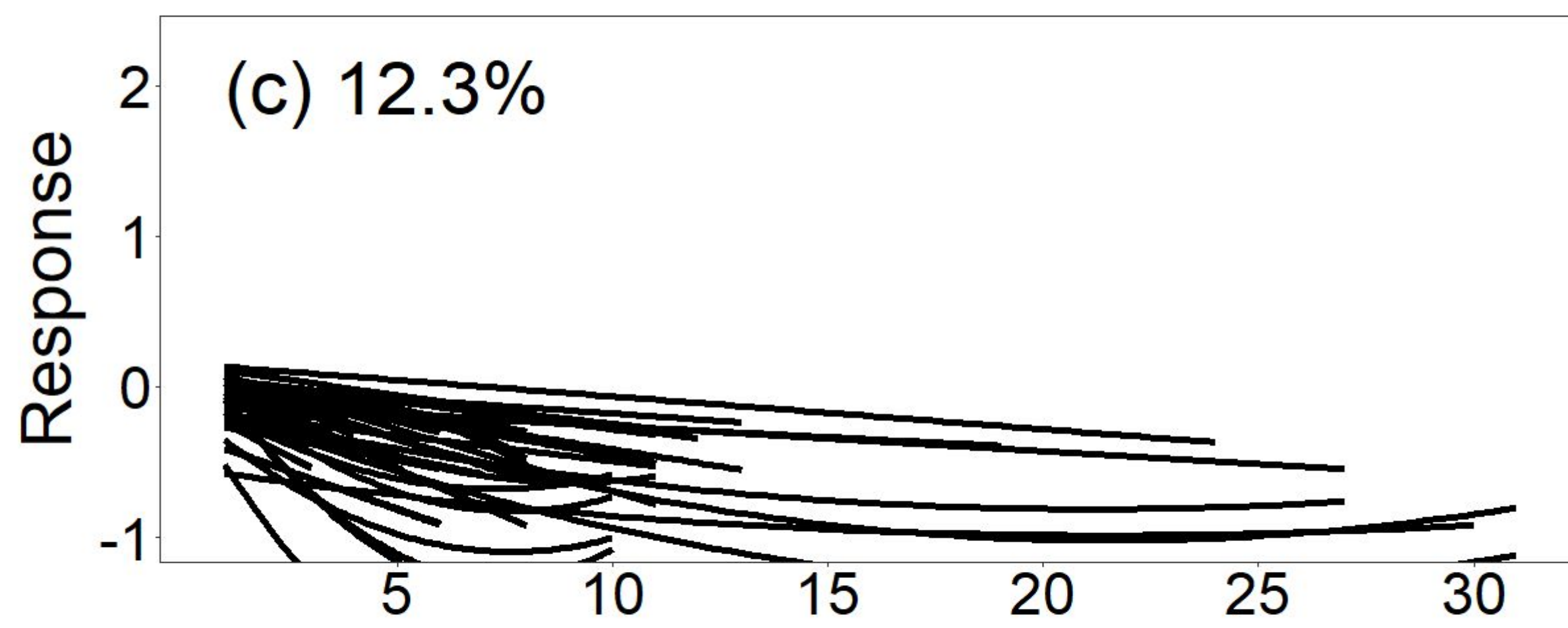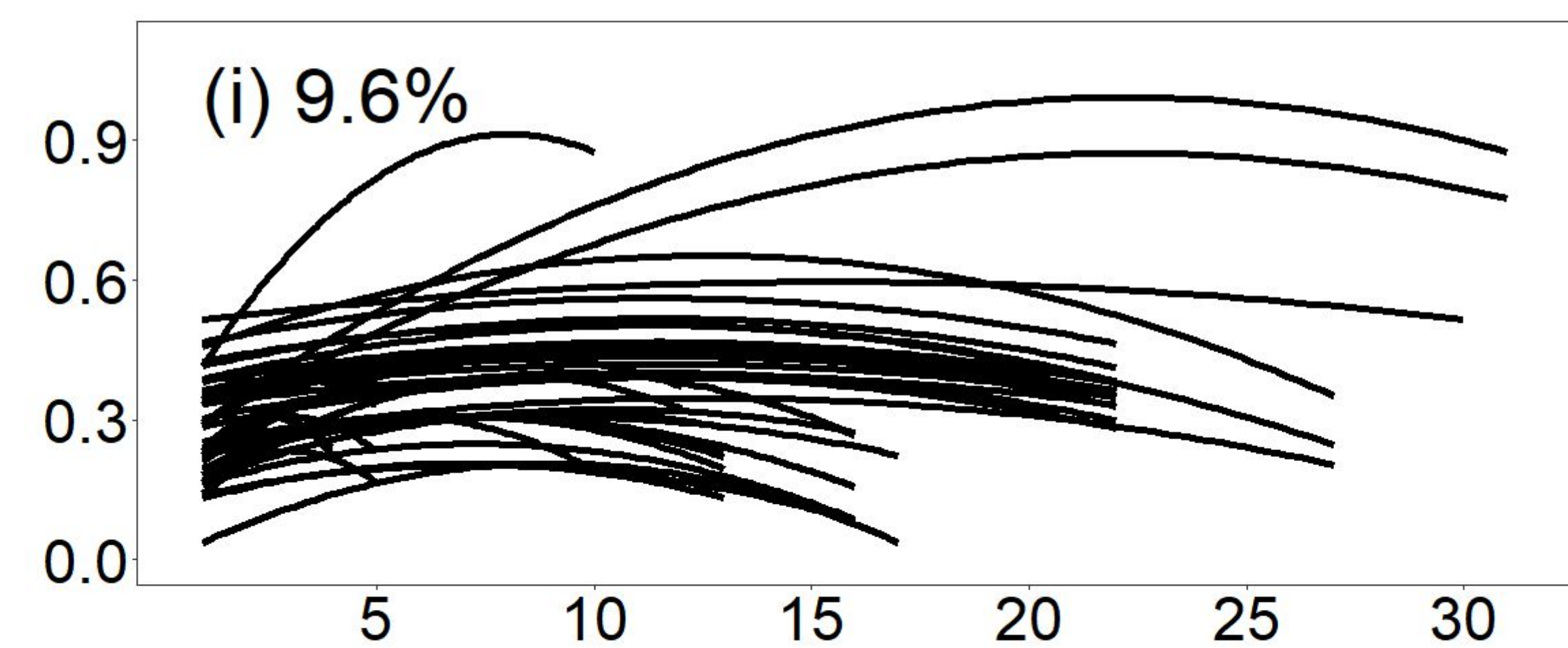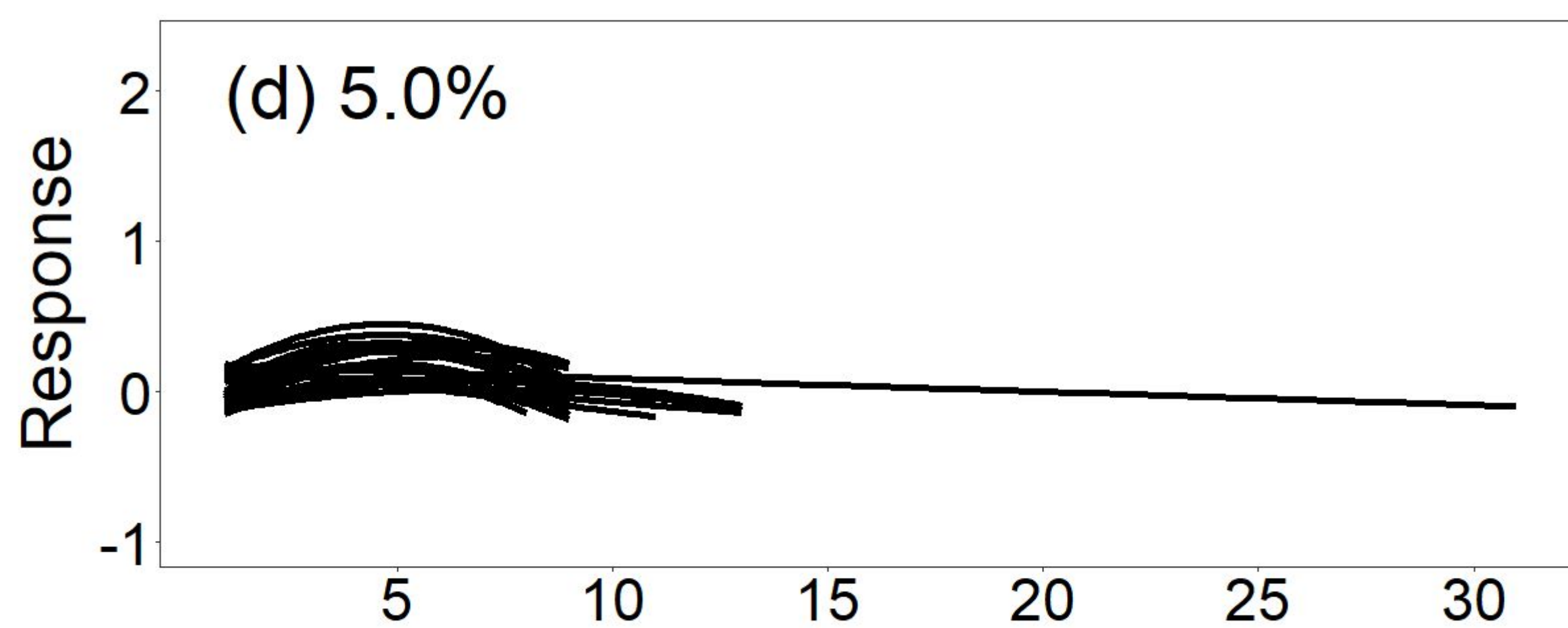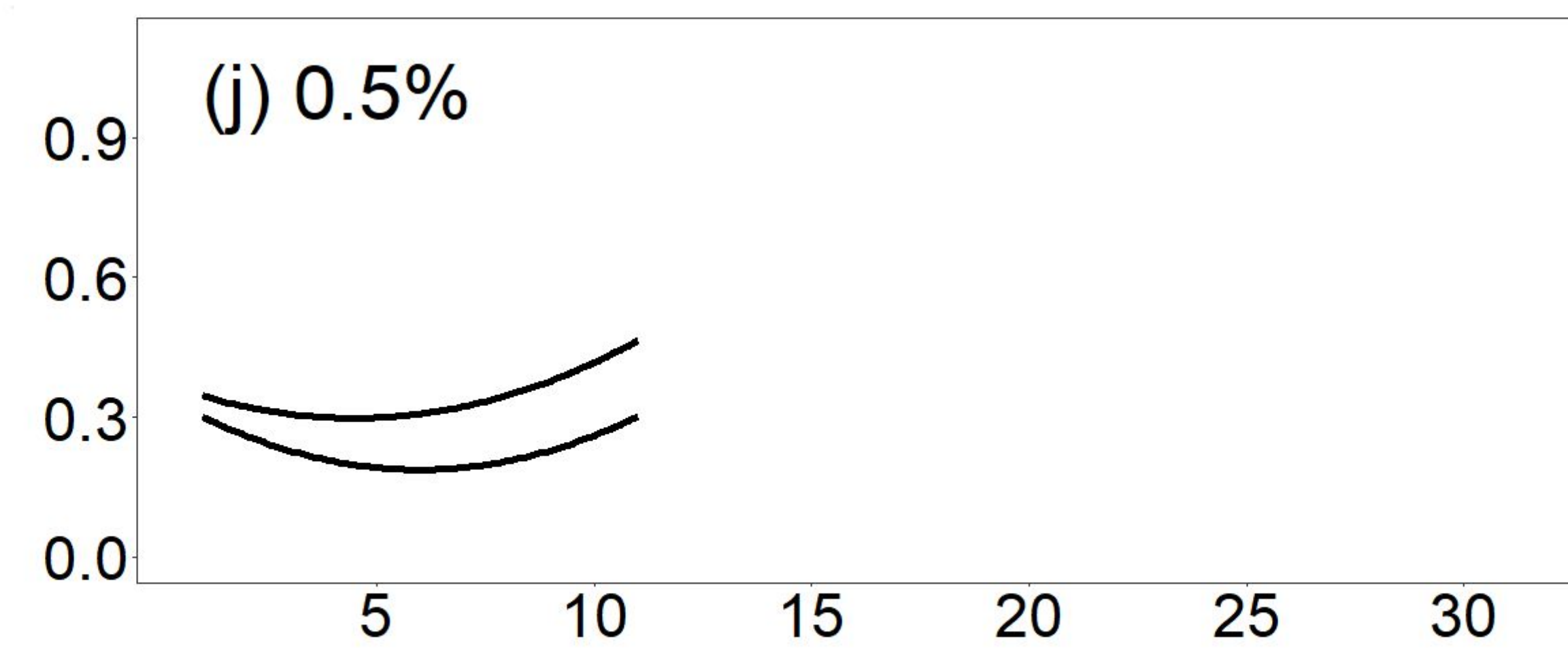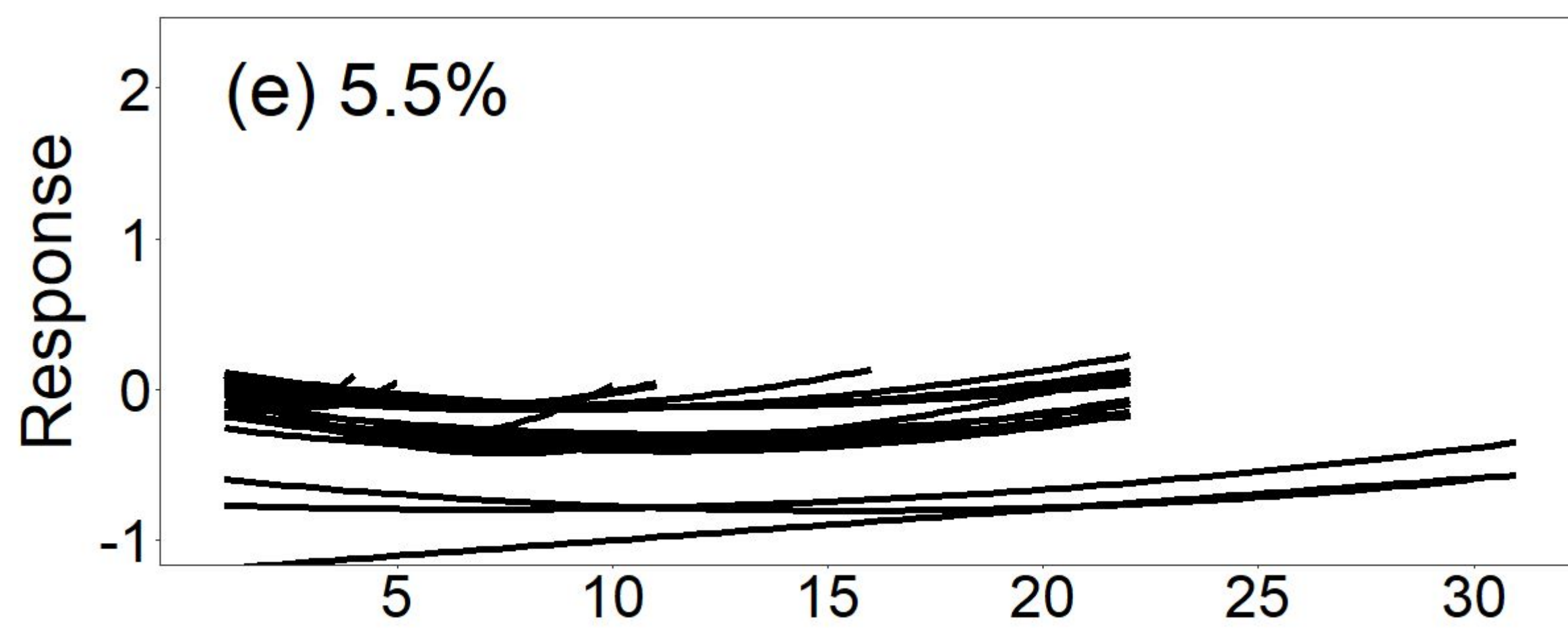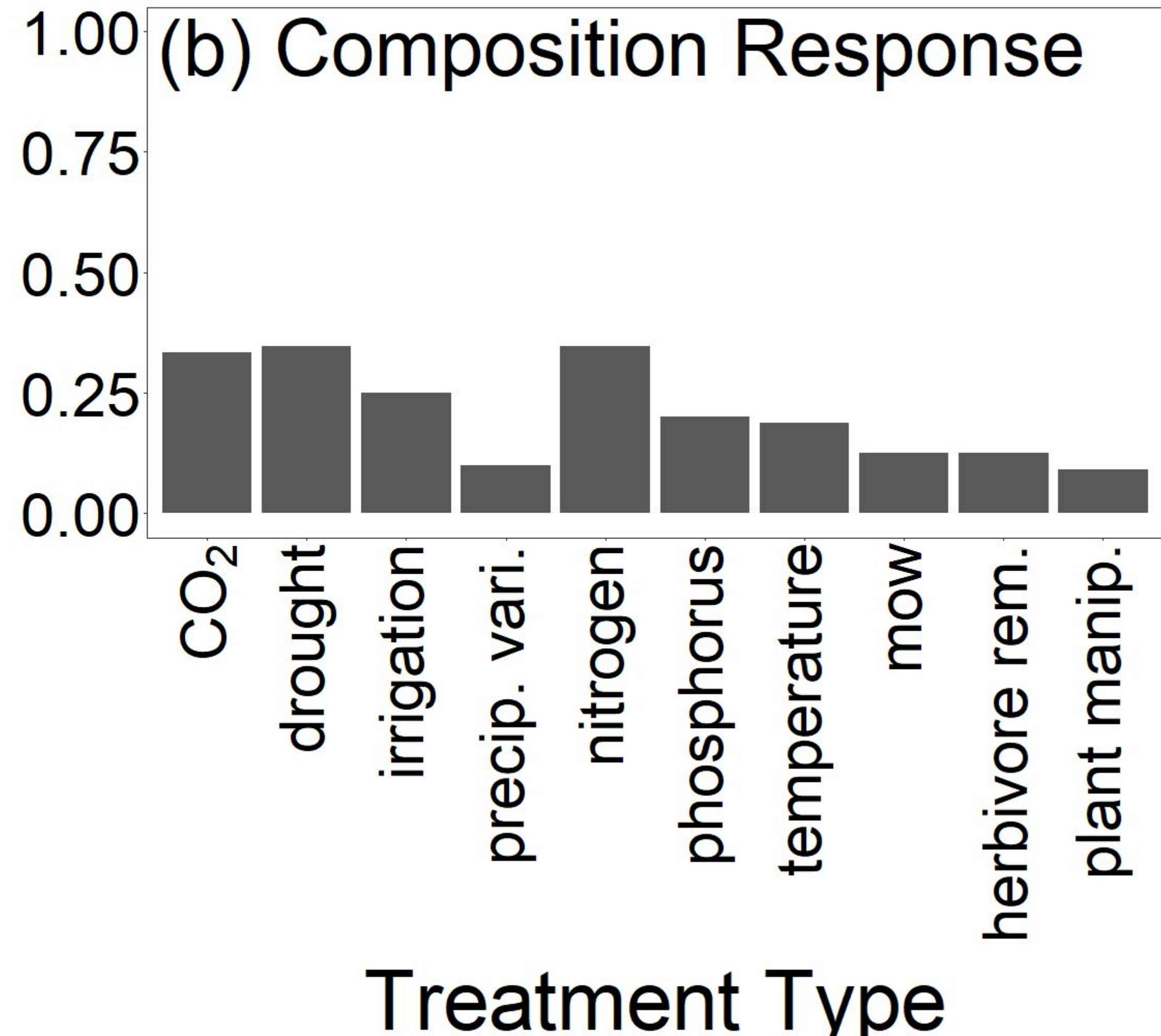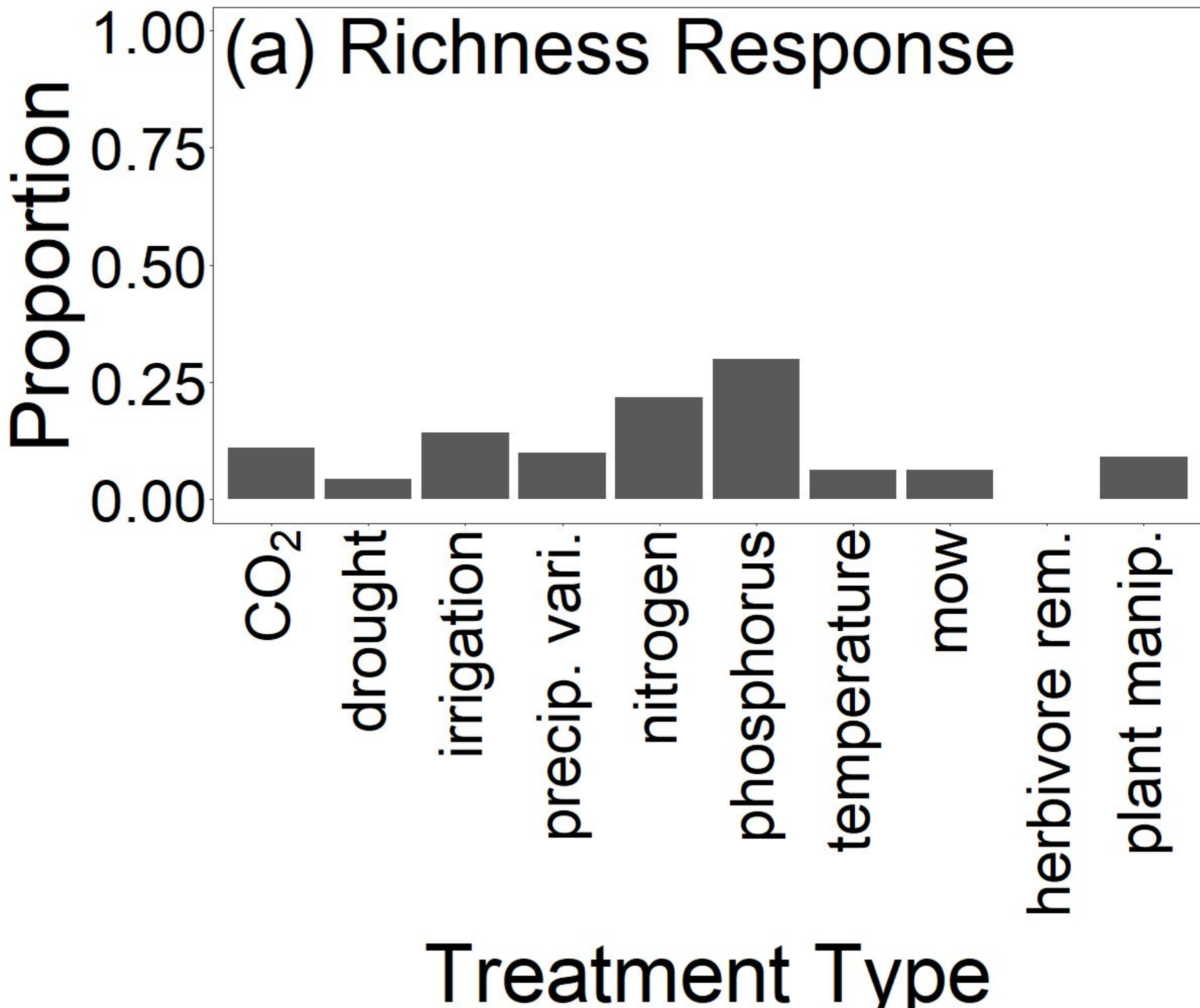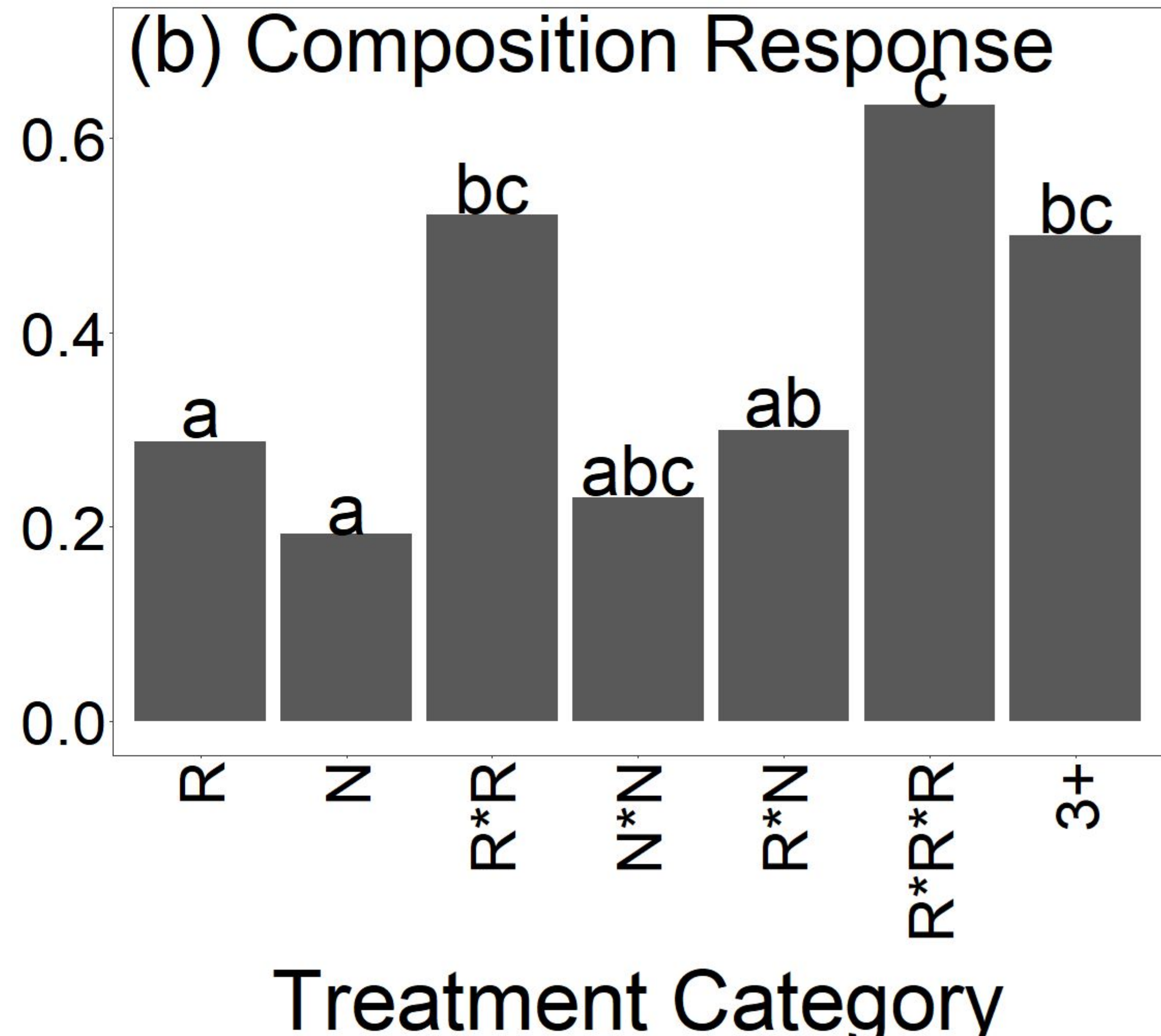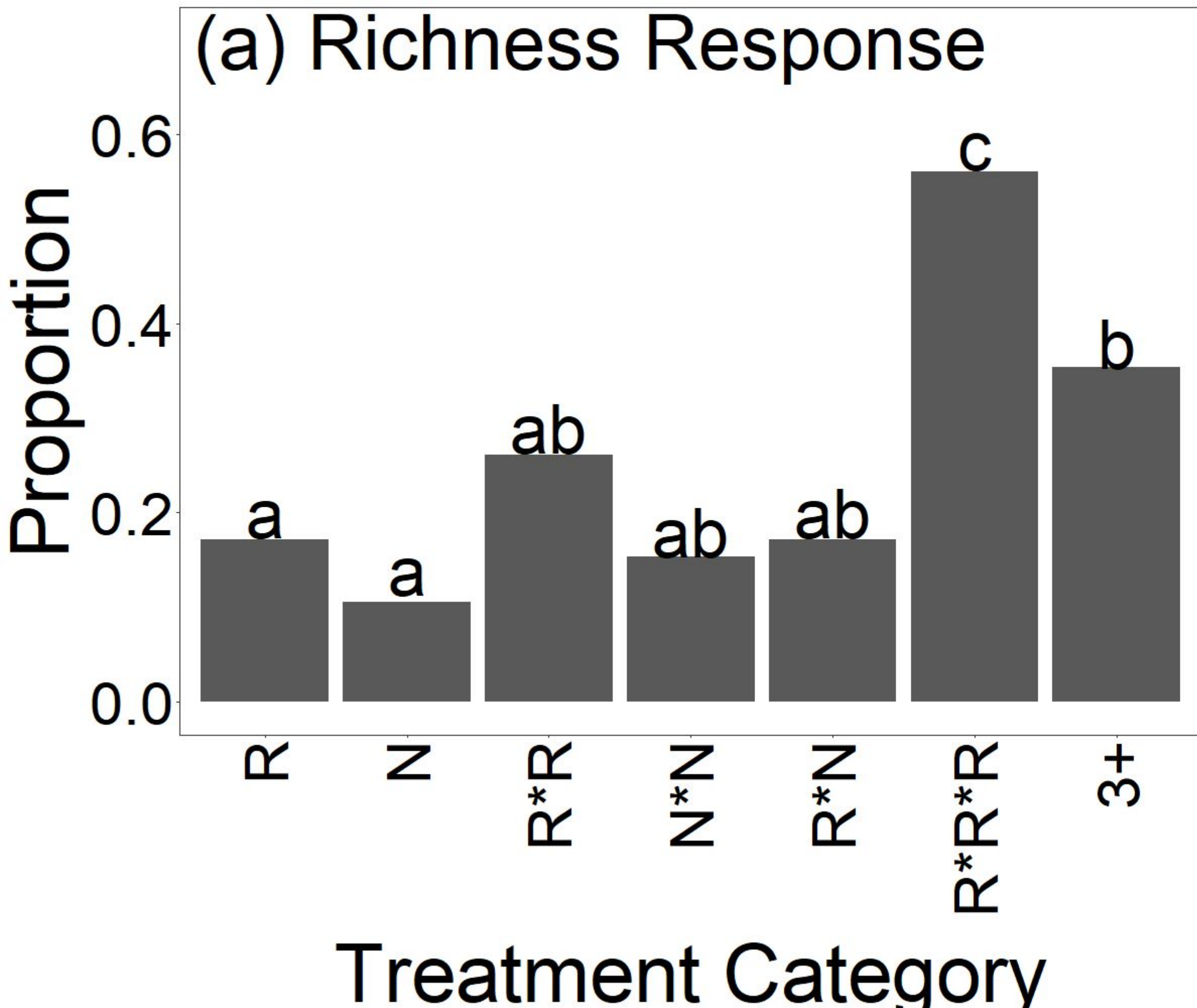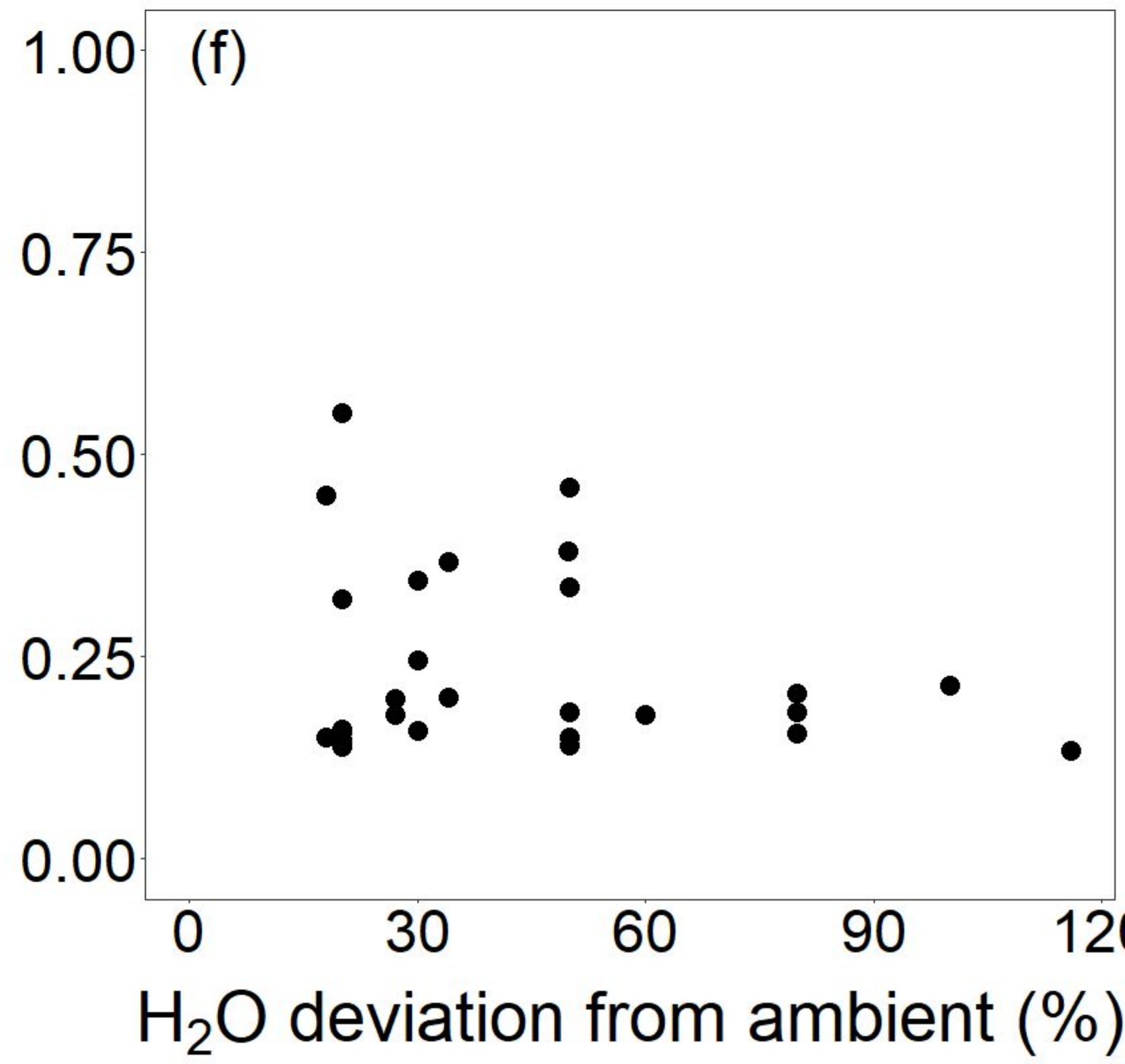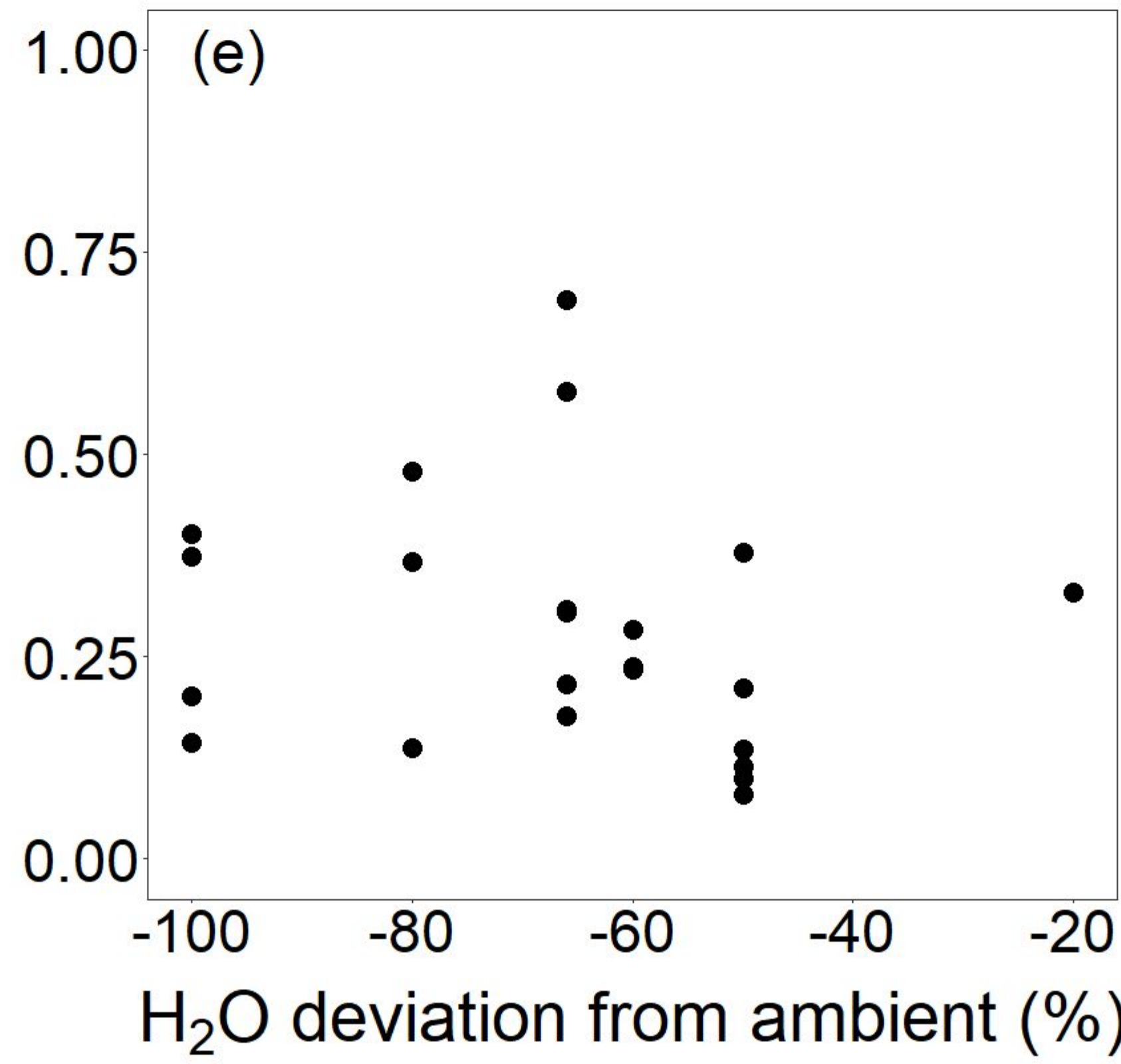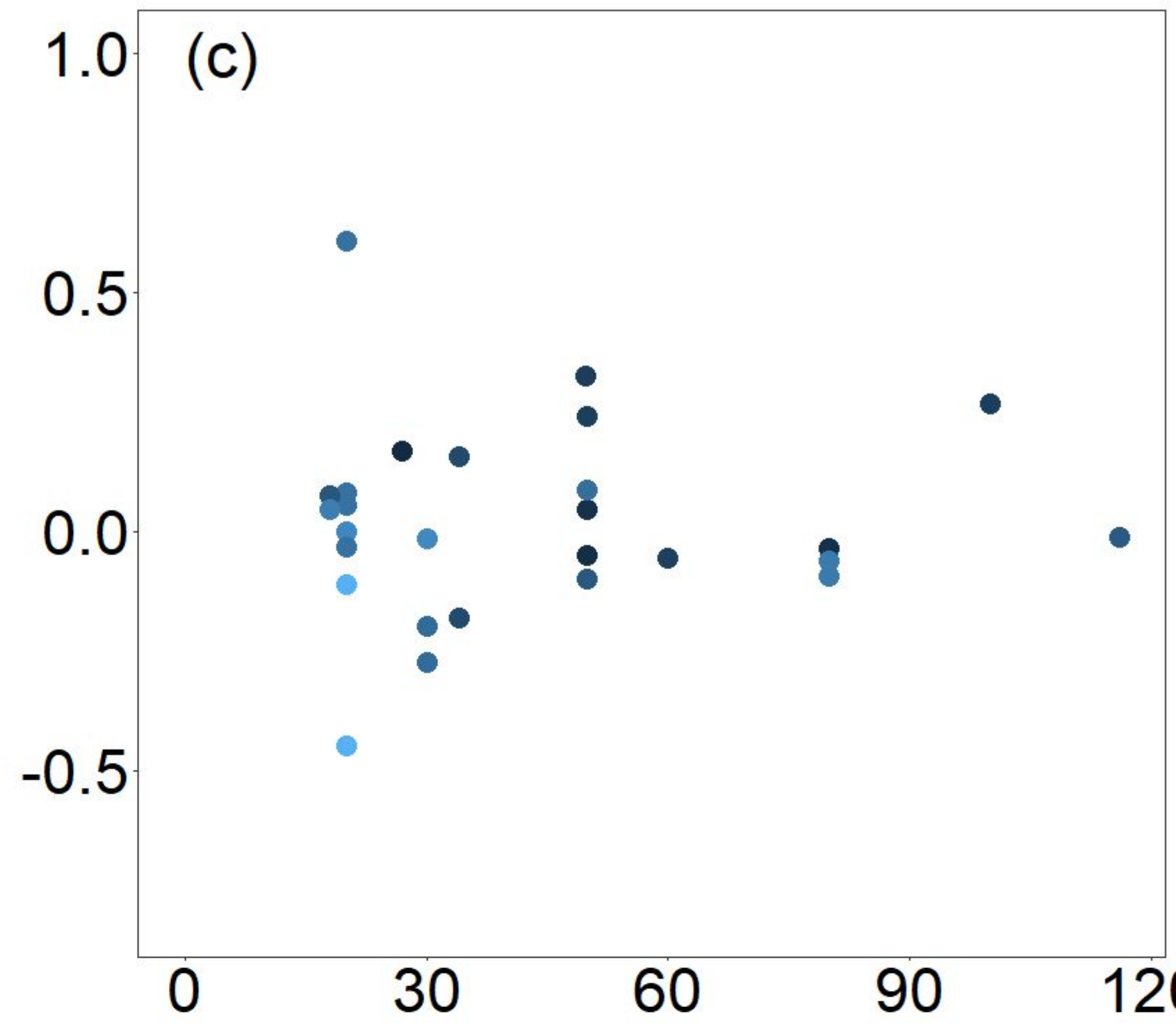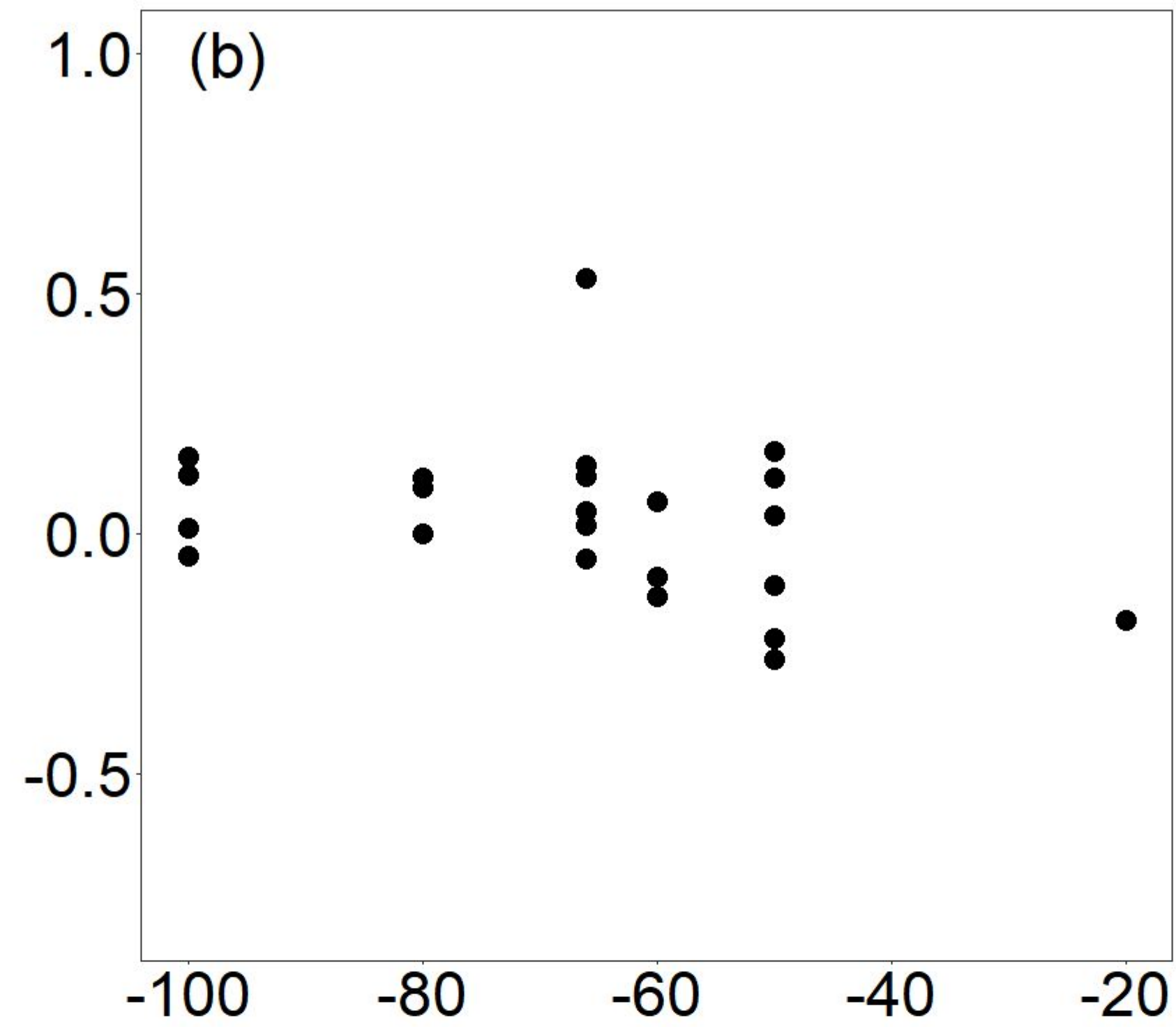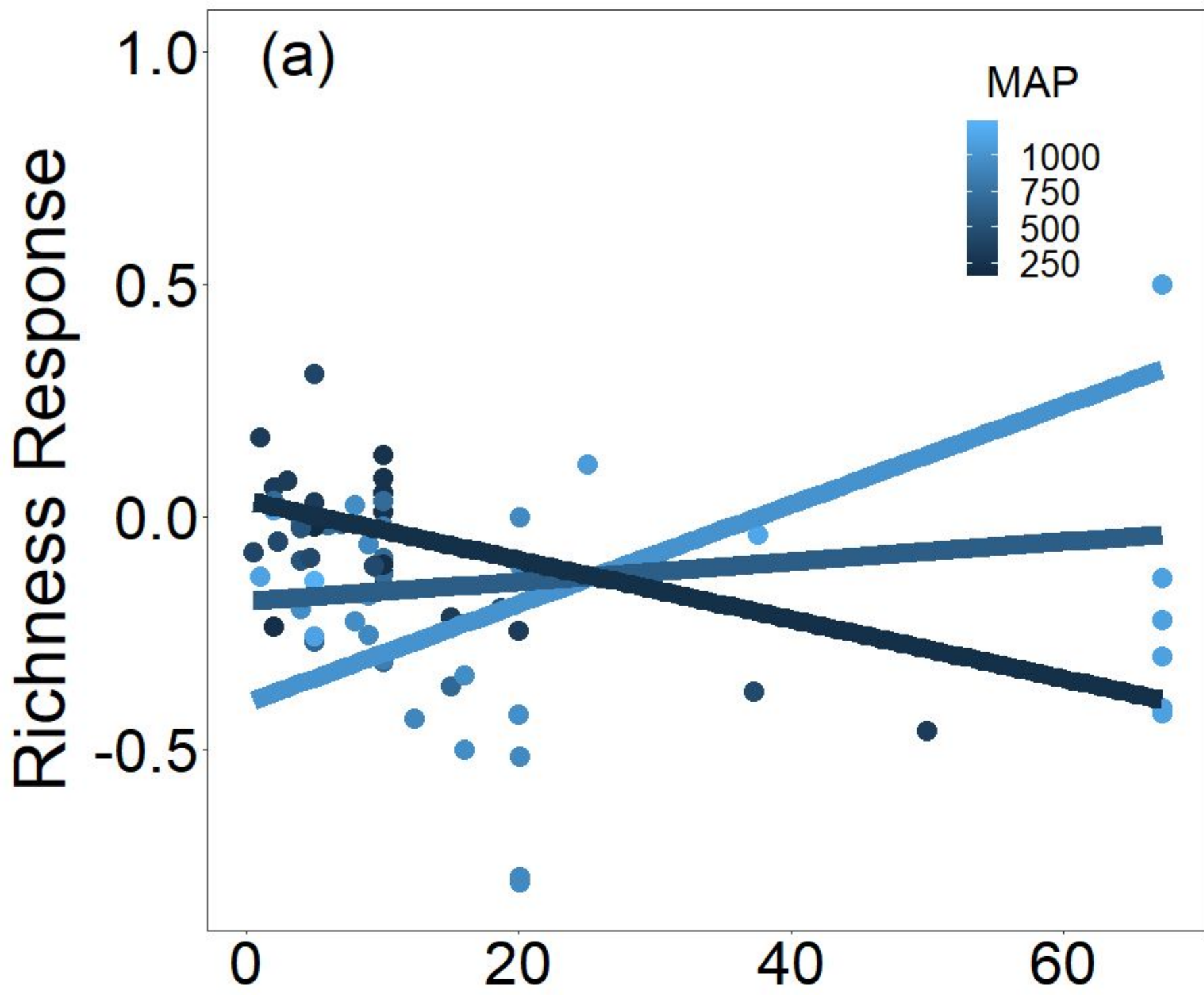
1　Table 1: Summary statistics of experiments (N=105) included in the data synthesis. See methods
2　for variable descriptions.
3

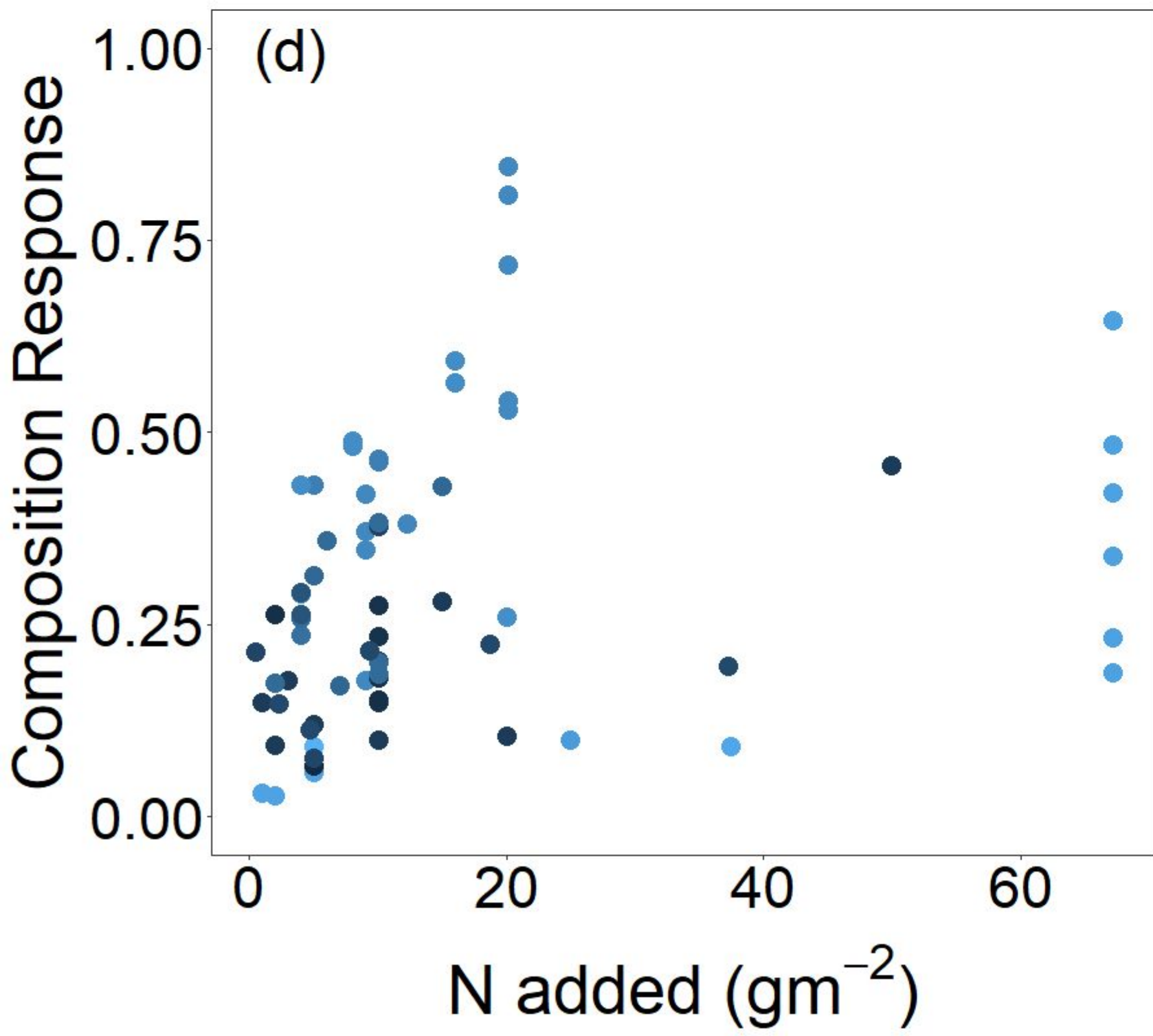| Variable	minimum	mean	maximum
Experiment Length (# years)	3	8	31
Number of Manipulations	1	2	5
Gamma Diversity (# species)	3	31	79
Aboveground Biomass (g m^{-2} yr^{-1})	1.5	349	1415
MAP (mm)	183	714	1526
MAT (°C)	-12	8	22

4

Table 2: Summary of the response shape of the richness (lnRR Richness, % Diff Richness), effective species number (lnRR eH), and composition differences across 438 treatments included in the data synthesis. Shown are percentages (with numbers in parentheses) of responses falling into each of 9 shape categories, split by experiment length into those less than 10 year (N=322 responses) and those greater than or equal to 10 years (N=116 responses) in length. Note that these percentages differ from Figure 1, which presents percentages of each response shape across all experiments regardless of length. See methods for response variable descriptions.

	Response Shape	lnRR Richness % (#)		% Diff. Richness % (#)		lnRR eH % (#)		Composition Diff. % (#)	
< 10 Years	no response	87.0	(280)	79.5	(256)	80.7	(259)	77.0	(248)
	linear increase	0.3	(1)	2.8	(9)	2.5	(8)	20.8	(67)
	delayed increase	0.0	(0)	0.0	(0)	0.3	(1)	0.0	(0)
	asymptotic increase	0.0	(0)	0.0	(0)	0.6	(2)	0.0	(0)
	linear decrease	6.5	(21)	9.0	(29)	8.4	(27)	0.0	(0)
	delayed decrease	0.6	(2)	0.3	(1)	0.9	(3)	0.0	(0)
	asymptotic decrease	0.0	(0)	0.6	(2)	0.0	(0)	0.0	(0)
	concave down	5.0	(16)	5.9	(19)	6.2	(20)	2.2	(7)
	concave up	0.6	(2)	1.9	(6)	0.3	(1)	0.0	(0)
≥ 10 Years	no response	50.0	(58)	41.4	(48)	44.0	(51)	29.3	(34)
	linear increase	0.0	(0)	0.9	(1)	1.7	(2)	22.4	(26)
	delayed increase	0.0	(0)	0.0	(0)	0.0	(0)	4.3	(5)
	asymptotic increase	0.0	(0)	0.0	(0)	0.0	(0)	12.1	(14)
	linear decrease	16.4	(19)	19.0	(22)	21.6	(25)	0.0	(0)
	delayed decrease	0.0	(0)	0.0	(0)	0.0	(0)	0.0	(0)
	asymptotic decrease	9.5	(11)	13.8	(16)	11.2	(13)	0.0	(0)
	concave down	5.2	(6)	8.6	(10)	7.8	(9)	30.2	(35)

	concave up	19.0 (22)	16.4 (19)	13.8 (16)	1.7 (2)

9

1   Table 3: Across all datasets, temporal plant community responses (lnRR richness and
2   composition differences) to global change treatments do not vary by treatment type among single
3   resource or non-resource manipulations (richness: X^2=12.47, df=11, p=0.330; composition:
4   X^2=9.42, df=11, p=0.583), but do vary by treatment category among multi-factorial
5   manipulations (richness: X^2=21.85, df=6, p=0.001; composition: X^2=15.78, df=6, p=0.015).
6   Across only long-term (≥10 years) datasets, temporal plant community responses to global
7   change treatments do not vary by treatment type among single resource or non-resource
8   manipulations (richness: X^2=3.36, df=10, p=0.972; composition: X^2=4.21, df=10, p=0.938) or
9   treatment category among multi-factorial manipulations (richness: X^2=3.01, df=6, p=0.808;
10   composition: X^2=1.39, df=6, p=0.967). For the long-term experiments, exclusion of treatment
11   types or categories with fewer than 3 replicates did not qualitatively affect the results. Number
12   and proportion of each treatment type/category that showed a significant temporal response to
13   experimental global change manipulations. Significant (p<0.05) differences in the proportion of
14   richness and composition responses among treatment categories indicated by letters as
15   determined by Fisher's exact test for all pairwise combinations.
16

	Treatment Type/Category	Total Possible Responses	# Richness Responses	Proportion Significant Richness Responses	# Composition Responses	Proportion Significant Composition Responses
Treatment Type	CO_2	9	1	0.11	3	0.33
	drought	23	1	0.04	8	0.35
	irrigation	28	4	0.14	7	0.25
	precip. variability	10	1	0.10	1	0.10
	nitrogen	69	15	0.22	24	0.35
	phosphorus	20	6	0.30	4	0.20
	other resource	4	0	0.00	0	0.00
	temperature	16	1	0.06	3	0.19
	mowing/clipping	16	1	0.06	2	0.13
	herbivore removal	8	0	0.00	1	0.13
	plant manipulation	11	1	0.09	1	0.09
	other non-resource	6	3	0.50	4	0.67
Treatment Category	single resource	163	28	0.17[a]	47	0.29[a]
	single non-resource	57	6	0.11[a]	11	0.19[a]
	resource*resource	46	12	0.26[ab]	24	0.52[bc]
	non-res.*non-res.	13	2	0.15[ab]	3	0.23[abc]
	resource*non-res.	70	12	0.17[ab]	21	0.30[ab]
	3+ resources	41	23	0.56[c]	26	0.63[c]
	#+ res. and non-res.	48	17	0.35[b]	24	0.50[bc]
	OVERALL	438	100	0.23	156	0.36

17