

## Supplementary materials

Table S1. Species composition and dominant species of different vegetation community at Nanling Mountains

Vegetation types	Altitudes	S	$H'$	$D$	$E$	Dominant species	Soil Type
Valley evergreen broad-leaved forest	413	37	2.76	0.90	0.76	<i>Machilus kwangtungensis</i> , <i>Castanopsis lamontii</i> , <i>M. chinensis</i> , <i>Syzygium buxifolium</i> , <i>Lithocarpus glaber</i>	yellow soil
	421	47	2.83	0.90	0.74	<i>M. kwangtungensis</i> , <i>S. buxifolium</i> , <i>Diospyros morrisia</i> , <i>L. glaber</i> , <i>L. harlandii</i>	yellow soil
	439	63	3.26	0.93	0.79	<i>M. kwangtungensis</i> , <i>C. fordii</i> , <i>Exbucklandia tonkinensis</i> , <i>C. hystrix</i> , <i>C. lamontii</i>	yellow soil
	839	69	3.58	0.96	0.85	<i>M. kwangtungensis</i> , <i>Cyclobalanopsis glauca</i> , <i>Castanopsis faberi</i> , <i>C. carlesii</i> , <i>Castanopsis lamontii</i>	yellow soil
	842	59	3.53	0.96	0.86	<i>Cyclobalanopsis glauca</i> , <i>M. kwangtungensis</i> , <i>Castanopsis faberi</i> , <i>C. carlesii</i>	yellow soil
	843	73	3.93	0.98	0.92	<i>C. uraiana</i> , <i>C. carlesii</i> , <i>Cyclobalanopsis myrsinifolia</i> , <i>Pinus massonia</i> , <i>L. glaber</i>	yellow soil
Mountain evergreen broad-leaved forest	918	46	2.87	0.91	0.75	<i>Castanopsis eyrei</i> , <i>Fagus longipetiolata</i> , <i>Rhododendron simsii</i> , <i>Alniphyllum fortunei</i> , <i>M. chinensis</i>	yellow soil
	920	39	2.72	0.90	0.74	<i>C. eyrei</i> , <i>Fagus longipetiolata</i> , <i>Adindra millettii</i> , <i>R. simsii</i> , <i>Alniphyllum fortunei</i>	yellow soil
	925	59	3.25	0.94	0.80	<i>C. carlesii</i> , <i>Exbucklandia tonkinensis</i> , <i>R. cavaleriei</i> , <i>Cunninghamia lanceolata</i> , <i>Elaeocarpus decipiens</i>	yellow soil
	1170	92	3.76	0.96	0.83	<i>C. lamontii</i> , <i>C. faberi</i> , <i>Michelia maudiae</i> , <i>Cyclobalanopsis myrsinifolia</i> , <i>Cunninghamia lanceolata</i>	yellow soil
	1182	61	3.41	0.96	0.83	<i>Vernicia monta</i> , <i>Castanopsis faberi</i> , <i>C. carlesii</i> , <i>Liquidambar formosa</i> , <i>Manglietia fordia</i>	yellow soil
	1205	73	3.71	0.96	0.87	<i>Cyclobalanopsis glauca</i> , <i>Castanopsis eyrei</i> , <i>V. monta</i> , <i>Betula luminifera</i> , <i>C. fissa</i>	yellow soil
Coniferous and broad-leaved mixed forest	1360	34	2.46	0.86	0.70	<i>Pinus kwangtungensis</i> , <i>Schima spp</i> , <i>Cleyera japonica</i> , <i>Pentaphylax euryoides</i> , <i>Pinus massonia</i>	yellow soil
	1360	70	3.48	0.95	0.82	<i>Schima spp</i> , <i>P. kwangtungensis</i> , <i>Castanopsis eyrei</i> , <i>C. lamontii</i> , <i>Pentaphylax euryoides</i>	yellow soil
	1388	58	3.32	0.94	0.82	<i>P. kwangtungensis</i> , <i>Castanopsis eyrei</i> , <i>Tsuga longibracteata</i> , <i>Pentaphylax euryoides</i>	yellow soil
	1398	61	3.34	0.95	0.81	<i>Cyclobalanopsis glauca</i> , <i>Castanopsis eyrei</i> , <i>M. chinensis</i> , <i>B. luminifera</i> , <i>Michelia figo</i>	yellow soil
	1504	57	2.93	0.88	0.72	<i>Schima spp</i> , <i>P. kwangtungensis</i> , <i>M. kwangtungensis</i> , <i>P. massonia</i>	yellow soil
	1517	61	3.50	0.95	0.85	<i>T. longibracteata</i> , <i>P. kwangtungensis</i> , <i>C. faberi</i> , <i>R. cavaleriei</i>	yellow soil

Mountain scrubby meadow	1548	10	0.78	1.85	0.80	<i>Miscanthus floridulus, Panicum psilopodium, Rubus setchuenensis, Melastoma dodecandrum, Hypericum seniavinii</i>	mountain scrubby-meadow soil
	1545	7	0.57	1.29	0.66	<i>Miscanthus floridulus, Microlepidia hancei, Panicum psilopodium, Melastoma dodecandrum,</i>	mountain scrubby-meadow soil
	1541	7	0.50	1.16	0.60	<i>Miscanthus floridulus, Microlepidia hancei, Dryopteris varia, Dicranopteris dichotoma, Callicarpa rubella</i>	mountain scrubby-meadow soil
	1687	38	2.83	0.90	0.78	<i>Styrax japonicus, Cyclobalanopsis glauca, Illicium ternstroemioides, Ilex chinensis</i>	yellow soil
Mountain brushwoods	1691	37	2.79	0.91	0.77	<i>C. glauca, S. japonicus, Cinnomum pauciflorum, Eurya japonica, Machilus kwangtungensis</i>	yellow soil
	1698	53	2.80	0.90	0.70	<i>S. japonicus, C. pauciflorum, C. glauca, I. chinensis</i>	yellow soil

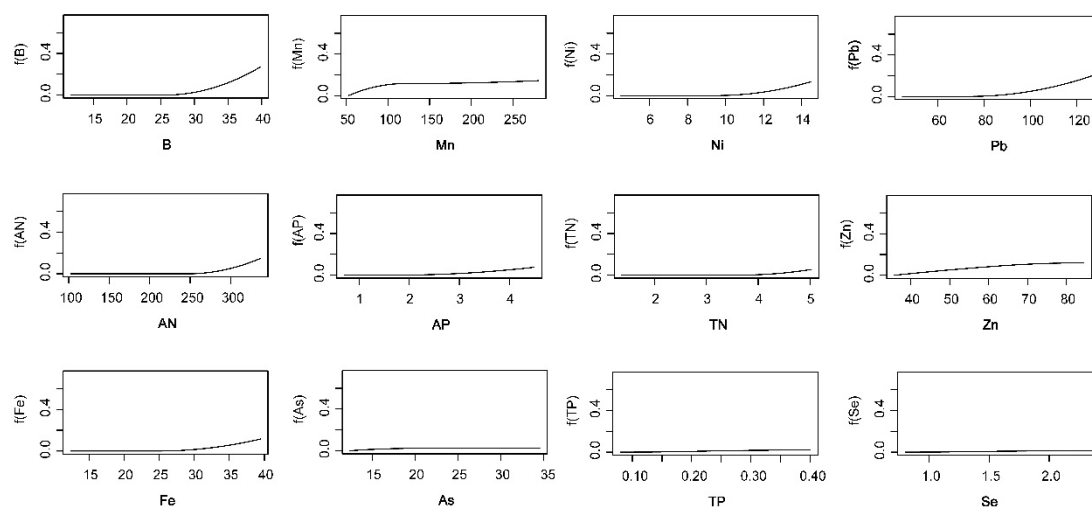


Figure S1. Partial response for 0-20 cm edaphic factors on trees' GDM.

Note: The codes and units of environmental factors referred to Table 1; The unit in x axis was original unit for the variables, the function  $f(\text{variable})$  in y axis indicated I-spline-transformed function, its unit was linking unit of community dissimilarity, i.e.,  $-\ln(1 - d_{ij})$ . The same below

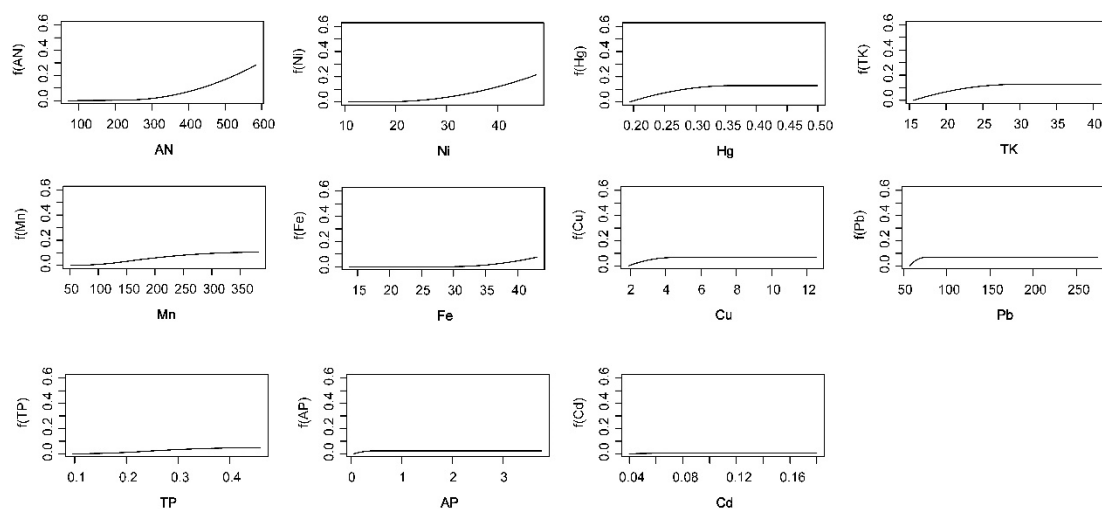


Figure S2. Partial response for 20-40 cm edaphic factors on trees' GDM.

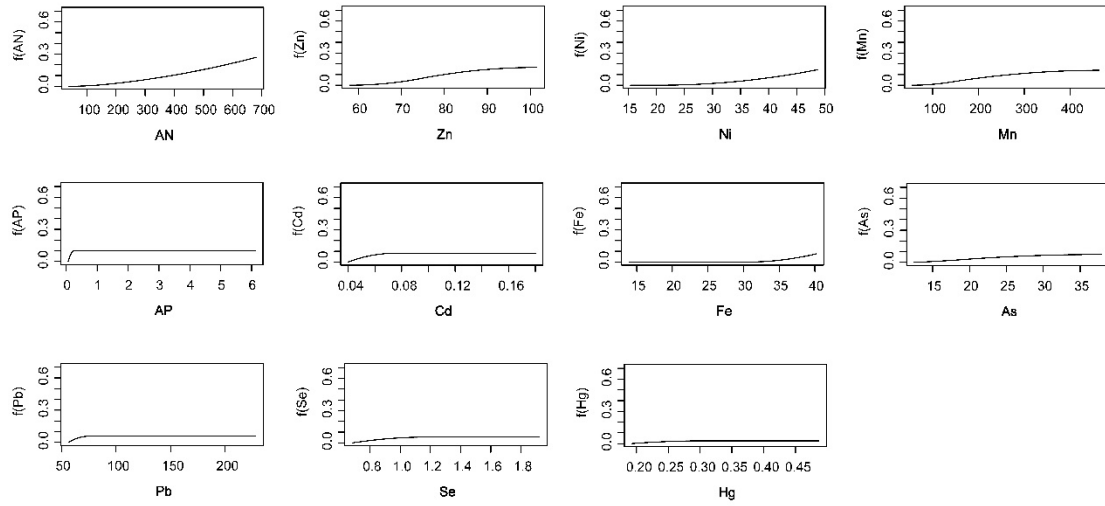


Figure S3. Partial response for 40-60 cm edaphic factors on trees' GDM.

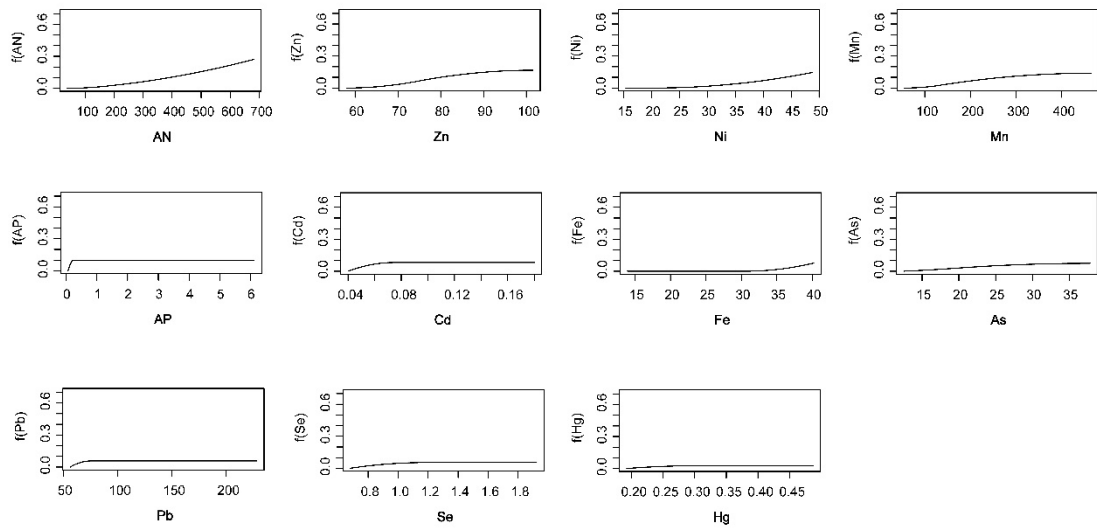


Figure S4. Partial response for 60-100 cm edaphic factors on trees' GDM.

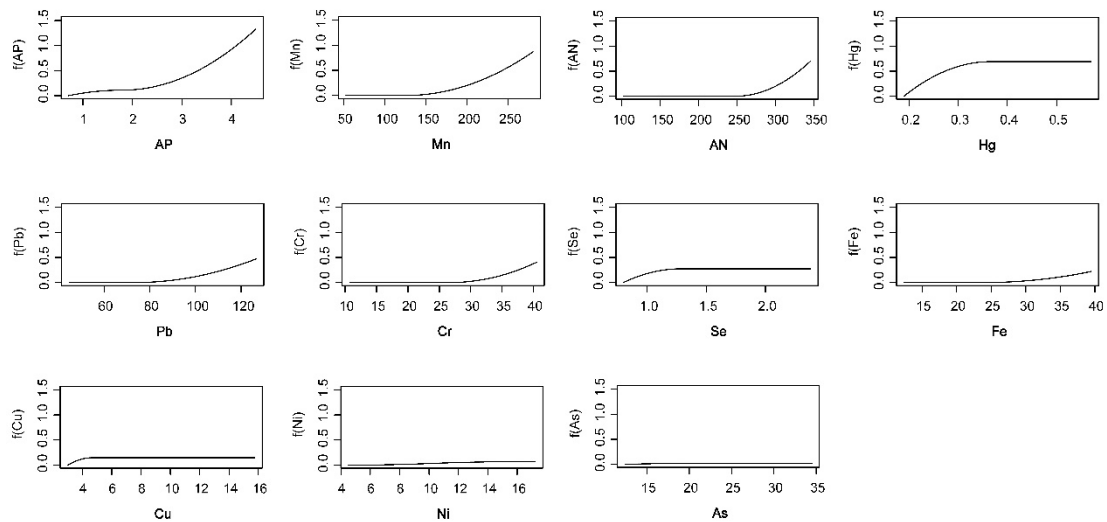


Figure S5. Partial response for 0-20 cm edaphic factors on shrubs' GDM.

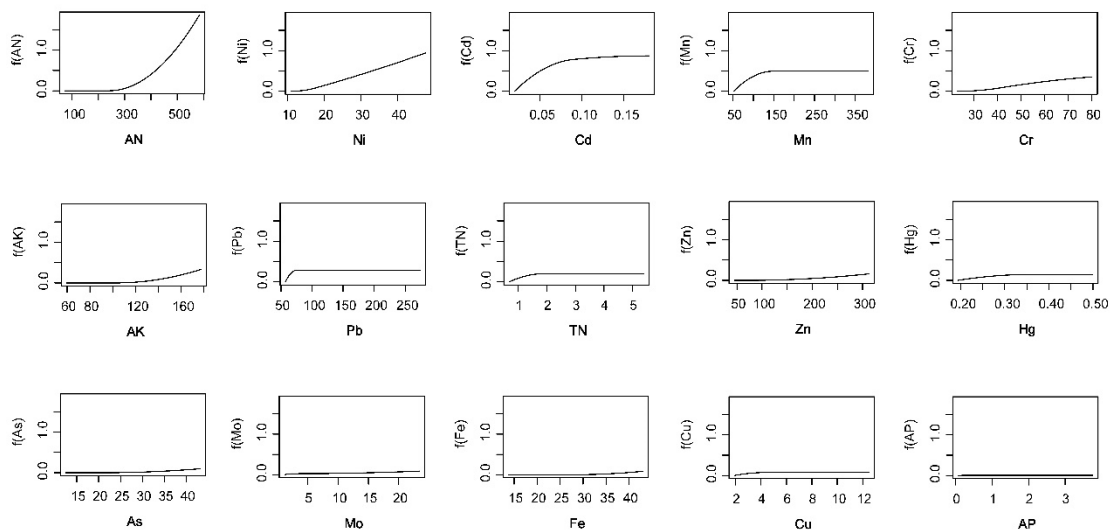


Figure S6. Partial response for 20-40 cm edaphic factors on shrubs' GDM.

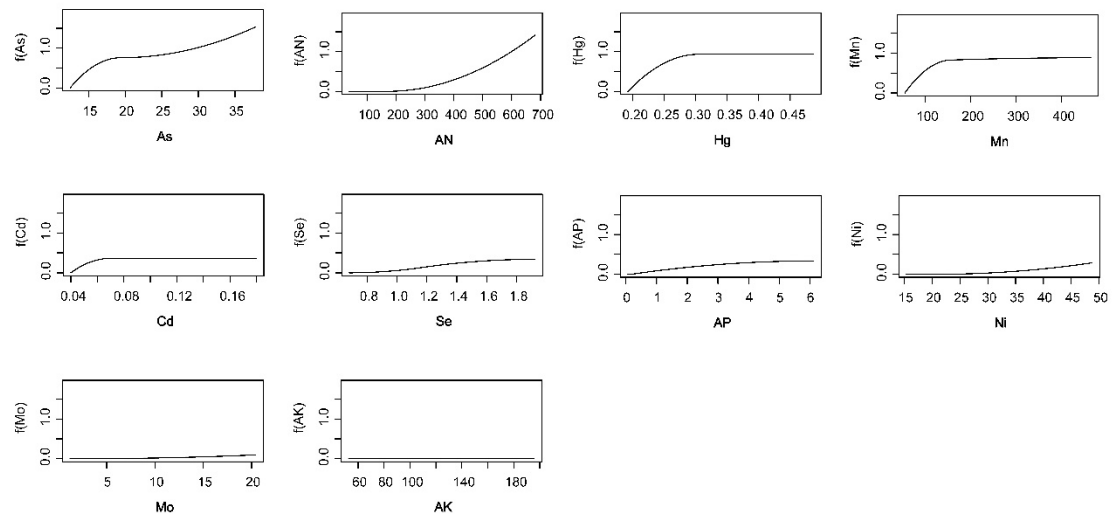


Figure S7. Partial response for 40-60 cm edaphic factors on shrubs' GDM.

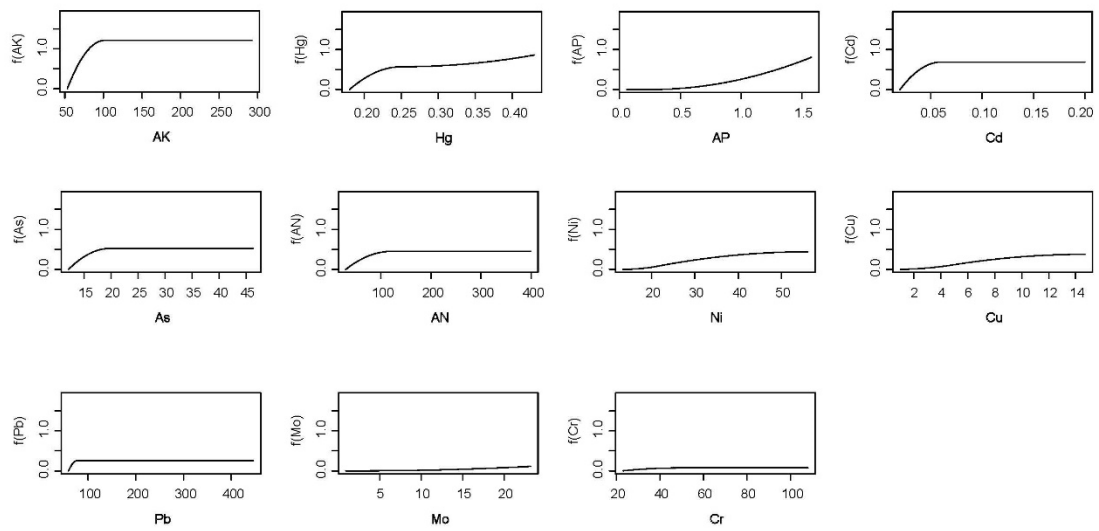


Figure S8. Partial response for 60-100 cm edaphic factors on shrubs' GDM.

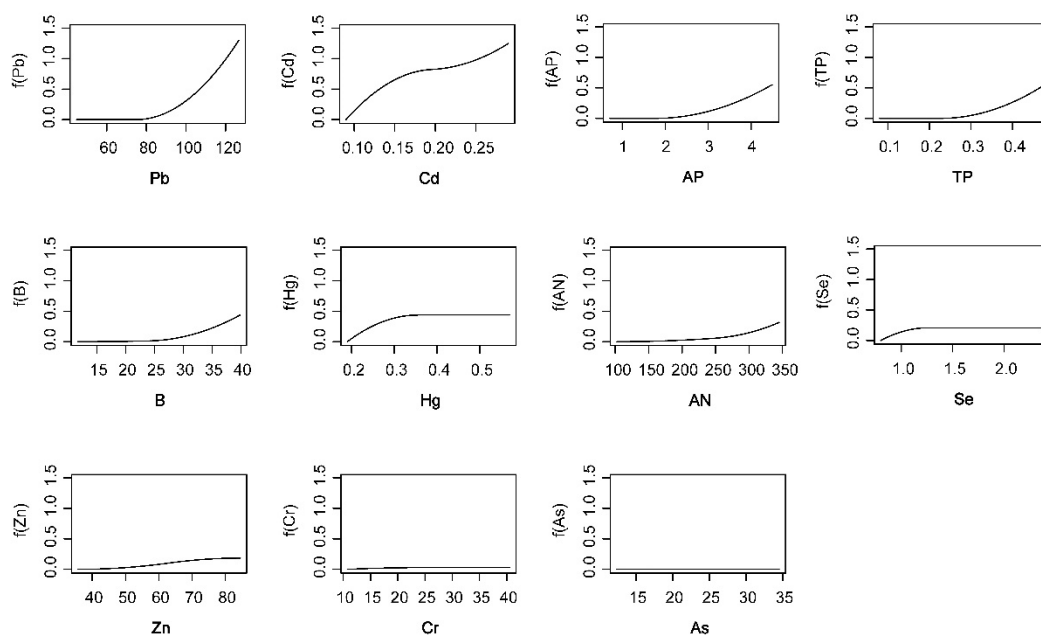


Figure S9. Partial response for 0-20 cm edaphic factors on herbs' GDM.

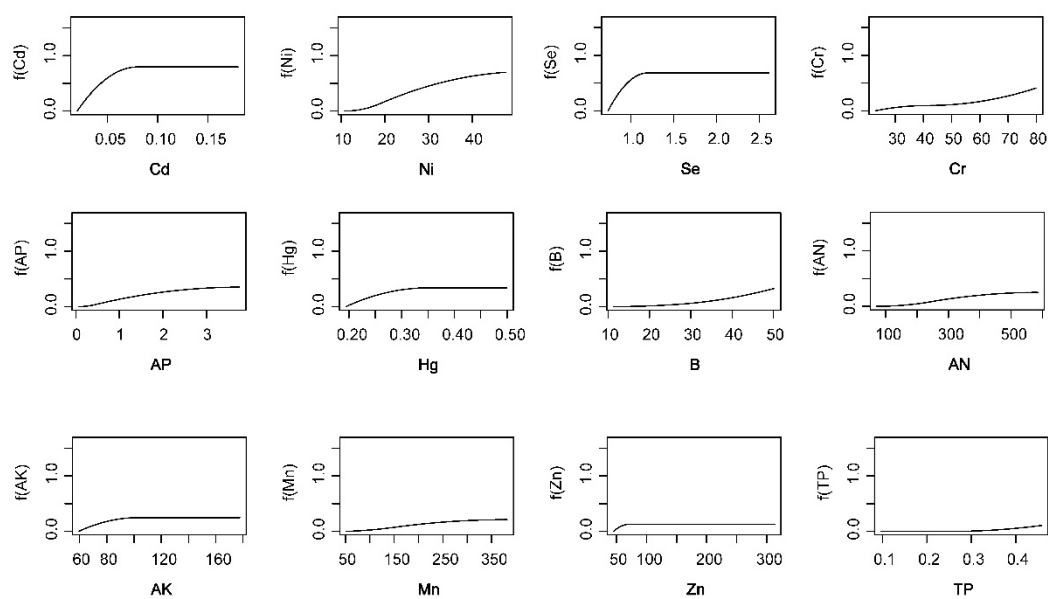


Figure S10. Partial response for 20-40 cm edaphic factors on herbs' GDM.

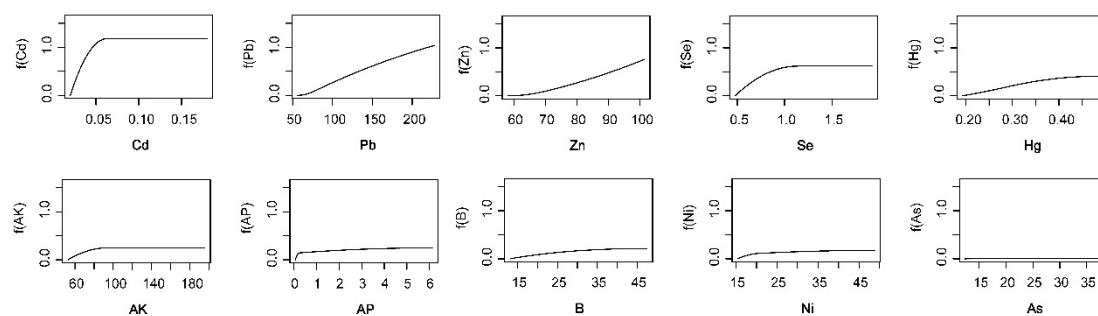


Figure S11. Partial response for 40-60 cm edaphic factors on herbs' GDM.

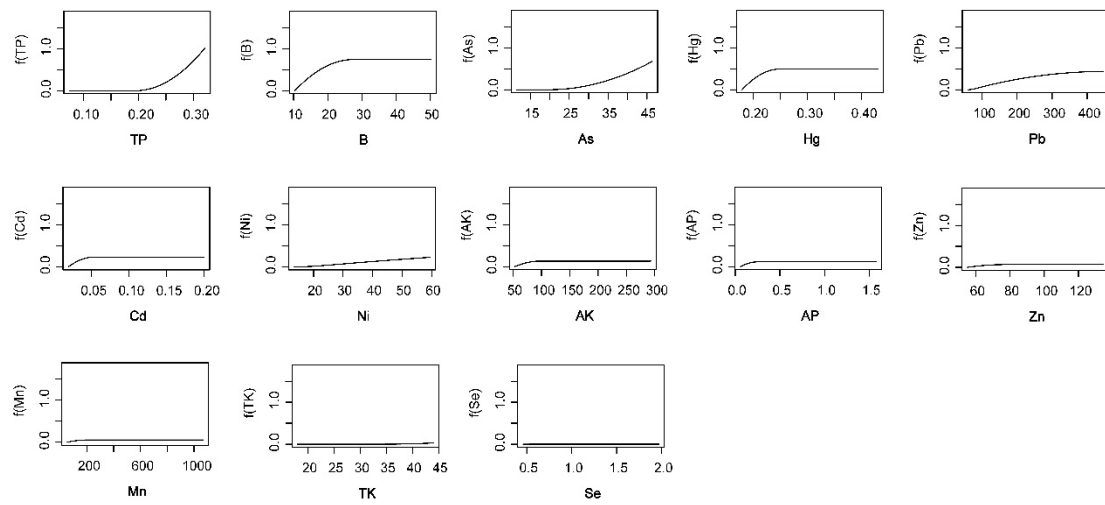


Figure S12. Partial response for 60-100 cm edaphic factors on herbs' GDM.