# Exchange of floristical relevés or exchange of calibrations between data banks?

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SUMMARY – In vegetation science, an exchange between two floristical data banks increases the ecological gradient of the registered relevés. Therefore, it also increases the discrimination between the behaviours of plants and, because of this, the distinctness of types of plant community. In practice, an exchange is restricted, on one hand by the priority given to the authors for processing their own relevés and, on the other hand, by the interest of a bank which needs a benefit from its registered files, in order to support and develop the data processing. On the other hand, there is another kind of exchange, that of the socio-ecological calibrations of plants, which keeps the data in their initial bank and so protects everyone's interest. That exchange unites the gradients of the banks and improves the understanding of the relevés. The socio-ecological calibration of a plant is the set of its fidelities compared to all the plants of the bank. The calibration defines a statistical space of fidelities, where distances express the implicit ecological differences and determine the classification of relevés in types of plant communities corresponding to homogenous environments. The melting of the calibrations coming from two banks defines a common space of fidelities where plants and relevés are localized and classified according to the common gradient covered by the two banks together.

KEY-WORDS – Ecological gradient, Fidelity, Stabilization, Plant community

## 1. WHY AN EXCHANGE BETWEEN TWO DATA BANKS IN VEGETATION SCIENCE?

The registration of floristical relevés and their informatical recording is realized on a national basis, for scientific and practical reasons (Mucina *et al.*, 1993; Rodwell *et al.*, 1995). It deals essentially with the floristical composition of the relevés, their geographical location and their bibliographical origin. An exchange between national banks is scientifically possible and might be a good deal. It is possible because the botanical data have been standardized and because the protocol of sampling and recording the data in the field has been also more or less standardized and included in a discipline. The exchange might be a good

deal thanks to: 1) a quantitative benefit, because of the increasing number of data and their territorial extension; 2) a qualitative benefit because of the enlarged ecological and floristical gradients shown by the relevés, therefore the stronger discrimination between the behaviours of plants and the better explanation of the differences between the relevés.

## 2. Practical restrictions to the exchange of relevés between two banks

### 2.1. *The copyright of the author of a relevé*

The deontology of a data bank, as the banks gathered by the French National Museum of Natural History, obliges to name the authors in any synthesis using their relevés. The deontology may be more restrictive.

### 2.2. *The interest of the producer of the bank*

For his part, the producer needs a benefit from its bank in order to support and develop the data processing. The producer himself has invested a long and exacting labour in the design and the realization of a bank: 1) programming the part of a bank in a phytosociological study; 2) critical examination of publications; 3) elaboration of a floristical code including the synonymies and the systematic relations between taxa; 4) coding of the phytosociological tables; 5) coding of abundance; 6) topographical localization of the relevés. For instance, the bank Sophy is the 15 years work of two scientists. It includes a set of specific informatical programs to register and record the data, to detect errors, to adapt statistical data processing. In particular, it shows regional phytosociological synthesis, and also maps of national floristical distributions (Ruffray *et al.*, 1989).

### 2.3. *A global exchange seems now impossible*

Nevertheless, partial and mutual exchanges may contribute to common scientific programs, with an agreement concerning the deontology of data processing. But there is another kind of exchange which should also be useful and should encounter neither of the previous obstacles.

## 3. Exchange of socio-ecological calibrations between two banks

### 3.1. *What means a socio-ecological calibration of plants?*

To calibrate a plant in vegetation science is to characterize its ecological behaviour according to its distribution among the diverse environments corresponding to the other plants. In particular, a calibration is used to balance

the meaning of plants in the comparison between the relevés and to determine ecologically homogeneous community-types. Practically, the calibration of a plant includes the fidelities of the plant to all the other plants of the bank, a fidelity being a probability. For a bank storing 5,626 plants, the calibration is a square table of 5,626 lines and columns. That table increases less and less as the number of relevés increases in the bank (Table 1).

TABLE 1
EFFECTIVES OF THE RELEVÉS AND THE TAXA IN THE BANK SOPHY

| year | recorded relevés | taxa | plants with abundance threshold | elementary observations | registered publications |
|---|---|---|---|---|---|
| 1982 | 12,000 | 900 | 1,223 | 250,000 | 200 |
| 1986 | 35,000 | 3,000 | 4,500 | 800,000 | 550 |
| 1993 | 63,640 | 3,585 | 5,626 | 1,500,000 | 1,000 |
| 1996 | 92,000 | 5,400 | 6,550 | 1,950,000 | 1,426 |

If the relevés seem akin to the heart of the bank, because they feed the flood of data, the calibration of plants is like the brain of the bank, because it permits the understanding of data. The calibration of plants on the scale of a national bank improves the understanding of a regional survey because it increases the sampled gradient (Brisse & Gruber, 1996).

### 3.2. *Melting of two calibrations*

As a national calibration improves the understanding of a regional survey, so the melting of two national calibrations should improve the understanding of the relevés in each of the two countries. The fidelity f of a plant to another one in all the relevés of the two banks may be computed from its fidelities f1 and f2 to the same plant and its frequencies n1 and n2 in each of the two banks. f is the weighted average of f1 and f2: $f = (f1 \times n1 + f2 \times n2) / (n1 + n2)$. So, the two calibrations of two banks may unite and reflect the behaviours of plants along the cumulation of the two gradients (Fig. 1).

The melting of the calibrations between two banks must include: 1) the fidelities of plants to plants; 2) their total frequencies; 3) the corresponding floristical code, in order to join the same taxa in the two banks; 4) preferably, the list of bibliographical sources. It is also to be wished that the increase of accuracy given by the melting of calibrations not be inconsistent with the loss of information given by the abundance of taxa in the relevés. Therefore, the exchange has to deal with the calibration of plants with thresholds of abundance, and it has to include the file of the thresholds of abundance and their total frequencies (Fig. 2).

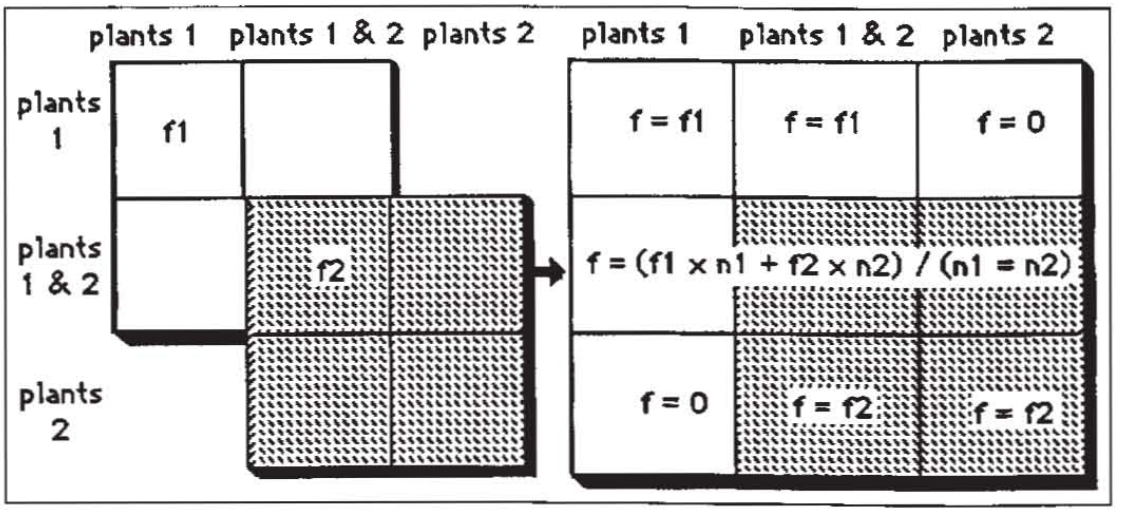


Figure 1.- *Melting of calibrations from two banks.* The white square represents the table of fidelities f1 according to bank 1, the tinted square represents the fidelities f2 according to bank 2, the big square, at the right, represents the table of fidelities f according to both banks together. A line corresponds to the behaviour of a plant P, a column corresponds to a plant considered as an index of the environment. plant 1 means the plants belonging only to bank 1, plant 2 to bank 2, and plant 1 & 2 to both banks. n1 and n2 mean the frequencies of the plant P in the banks 1 and 2.

## 4. Conclusion: Stabilization of a socio-ecological calibration along large gradients

Calibration of plants characterizes their ecological behaviour and initiates an ecological classification of vegetation types. From a local perspective, the ecological meaning of a taxon seems to change with the region. When calibrated along a large gradient, the behaviours of taxa prove quite distinct one from the other. A large sample of environments, even if it remains far from the global area of taxa, helps to stabilize the calibration of plants, and consequently the determination of vegetation types corresponding to ecological types.

Résumé – *Échange de relevés floristiques ou échange des étalonnages entre banques de données?* Un échange entre deux banques de données floristiques augmente le gradient écologique des relevés collationnés. De ce fait, il augmente aussi la discrimination des comportements des plantes ainsi que la stabilité des groupements qui s'en déduisent. En pratique, l'échange des relevés est limité, d'un côté par le droit des auteurs dans l'exploitation de leurs relevés, et d'un autre côté par le bénéfice que chaque banque doit tirer de ses fichiers informatisés pour les maintenir et les développer. En revanche, un autre échange, celui des étalonnages socio-écologiques des plantes, maintient les relevés dans la banque où ils sont et préserve ainsi les intérêts de chacun. Cependant, cet autre échange additionne lui aussi les gradients des banques et il améliore l'interprétation des relevés.

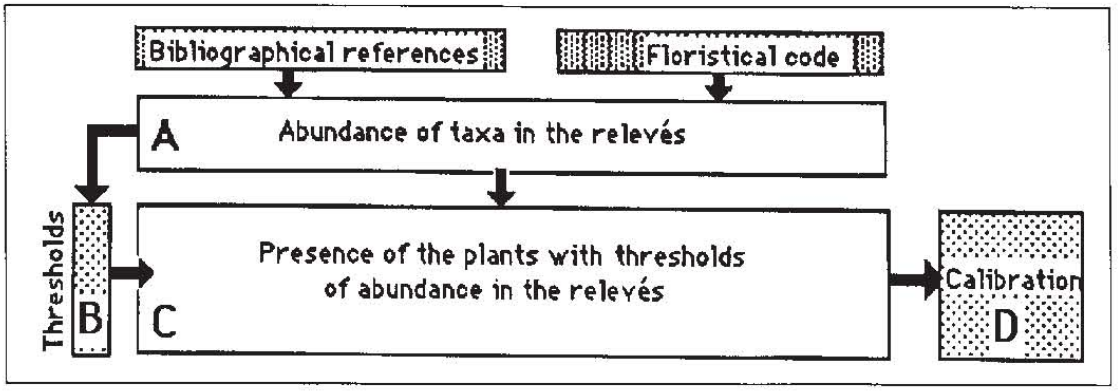


Figure 2.- *Files needed by an exchange of calibrations* (with tinted frames). The white frames may stay in their initial bank. A and C = the phytosociological tables for all the relevés in the bank, in which a line corresponds to a plant and a column to a relevé. B includes the thresholds of abundance used to split the taxa. D = the square table of the fidelities of plants to plants.

L'étalonnage socio-écologique d'une plante est l'ensemble de ses fidélités à toutes les autres plantes de la banque. L'étalonnage définit un espace des fidélités où les distances expriment des différences écologiques implicites et permettent de classer les relevés en groupements végétaux écologiquement homogènes. La fusion des étalonnages issus de deux banques définit un espace commun des fidélités où les plantes et les relevés sont localisés et classés selon le gradient couvert par les deux banques ensemble.

## ACKNOWLEDGMENTS

These research has been supported by the «Conseil Régional de la Région Provence Alpes Côte d'Azur (PACA)».

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