The sorting of species – relevé groups in phytosociology by means of an information processor

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A rapid and efficient process for arranging a Braun-Blanquet phytosociological table is described. By means of an Information Processing System, a table containing up to 220 relevés and 980 species can be manipulated and produced for publication.

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'n Vinnige en doeltreffende proses vir die rangskikking van 'n Braun-Blanquet plantsosiologiese tabel word beskryf. Deur middel van 'n inligting-verwerkingstelsel kan 'n tabel bestaande uit 220 relevés en 980 spesies bewerk en vir publikasie geproduseer word.

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Introduction

The process of arranging a Braun-Blanquet phytosociological table has been the dilemma of many phytosociologists in recent years. Numerous solutions have been presented, including manual rearrangement (Müller *et al.* 1972) and computer tabulation (Cĕska & Roemer 1971; Spatz & Siegmund 1973). After making extensive use of computer tabulation (Cĕska & Roemer 1971), an alternative, more rapid and efficient process was developed using the ICL 7700 Information Processing System (IPS) and the WORDSKIL software package, although any other system (e.g. Wang or Philips) with similar facilities would be suitable.

Material and Methods

ICL's 7700 IPS comprises a software package called WORDSKIL which runs on a Word Processing Unit (WPU). The WPU consists of two video display units, one 8-inch disc unit and a Qume printer. The ICL 7700 IPS costs approximately R27 000 (excluding annual fee for up-dated software) and is available in South Africa from International Computers Limited. The system is described as a flexible, easy-to-use word processor, and is superior to common micro-computers.

After the 'systems disc' (WORDSKIL) is activated, a separate 'user's disc' is opened for entering the data. A matrix 240 characters wide and 999 lines long can be accommodated. This means that, allowing for headings and species names, a table of about 220 relevés and 980 species can be manipulated which is usually well within the requirements of most phytosociological studies. In a detailed study of the vegetation of the Andries Vosloo Kudu Reserve (Palmer 1981), data were entered after preliminary arrangement of the 'raw table' (Werger 1974). This is not a prerequisite and field data may be entered directly into the system, as was done with the short table of data presented here as an example (Table 1). Entering these 16 lines of data took approximately 15 min. A hard copy of the 'raw table' was produced immediately on the printer. Once the data table has been entered it may be thoroughly checked and then rearranged without the problem of transcribing errors which normally occur in such studies (Müller *et al.* 1972).

WORDSKIL provides an EDIT/M (move) facility which enables up to 20 rows of data (species) to be moved to any point in the table. This ensures a rapid examination

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Table 1 'Raw' phytosociological table of the Serpentine River aquatic vegetation

Species	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Phragmites australis	3	3	2	5		4	3	2	3		+	1	+														+		+		
Stenotaphrum secundatum		1	5	1	4						4	5	5	5		3		+	5		5	2			+			+		1	+
Juncus kraussii		1	2	1	3	2		1	2		3					3		3	2	3	1	5	5							2	
Scirpus littoralis						1		5		5					3		2								2		2	3	2	3	3
Chara globularis var. *kraussii*																	5														
Hydrocotyle verticillata												r																			
Falkia repens												r																			
Rumex crispus											+		+																		
Conyza scabrida														+																	
Typha latifolia subsp. *capensis*																		4		3		5	5				3		+		
Cliffortia strolibifera																			+												
Potamogeton pectinatus																								5	3	3		+		1	
Enteromorpha sp.																								3		2		1			
Cotula coronopifolia																									+			+		+	+
Scirpus ludwigii																												+		+	

of the possible species associations. Positively associated species are grouped, and the general and infrequent species which do not show clear associations ('tail species') are listed at the end of the table (Werger 1974). Although an intermediate table would normally be printed and examined at this stage, the table is not presented here. In our example the table with final species associations took 10 min to produce.

The second stage in the rearrangement of the matrix is to group relevés with similar species associations together (Werger 1974). WORDSKIL provides an EDIT/W (walk) facility which enables the operator to move one or more columns of text (relevés) across the table. A maximum of 20 rows can be operated on at one time. The column or columns of relevés being moved displace the existing matrix to the left or to the right, depending upon the direction of movement. The cursor is returned to the original co-ordinates (column, row), and the text is scrolled 20 rows (species). The operation of moving columns (relevés) is then repeated for the next 20 lines of text. The process of rearranging 27 relevés to produce the final table containing 15 species took a further 90 min (Table 2). Manipulating one relevé of a phytosociological table containing 56 relevés and 180 species in the Andries

Table 2 Phytosociological table of the Serpentine River aquatic vegetation

Species	24	26	28	30	25	31	10	15	17	06	08	27	29	23	18	20	22	11	02	03	04	13	12	14	19	21	05	16	09	01	07
Potamogeton pectinatus	5	3	+	1	3																										
Enteromorpha sp.	3	2	1																												
Cotula coronopifolia			+	+	+	+																									
Scirpus ludwigii			+	+																											
Scirpus littoralis			3	3	2	3	5	3	2	1	5	2	2																		
Typha latifolia subsp. *capensis*												3	+	5	4	3	5														
Differential species of the *Stenotaphrum secundatum-Juncus kraussii* community																															
Stenotaphrum secundatum			+	1	+	+									+		2	4	1	5	1	5	5	5	5	5	4	3			
Phragmites australis										4	2	+	+					+	3	2	5	+	1						3	3	2
Juncus kraussii				2						2	1			5	3	3	5	3	1	2	1				2	1	3	3	2		
Infrequent species																															
Rumex crispus																						+	+								
Chara globularis var. *kraussii*									5																						
Conyza scabrida									+																						
Falkia repens																				r											
Hydrocotyle verticillata																				r											
Cliffortia strolibifera																								+							

Vosloo Kudu Reserve study (Palmer 1981) took approximately 3 min, as naturally the process takes longer with a larger matrix. The only additional operation required to complete the table for publication is the drawing of lines between relevé and species groups.

Discussion

The sorting and rearrangement of species and relevés in the Braun-Blanquet table by means of an IPS has proved to be very rapid and has many advantages over manual and mainframe computer manipulations. Once the raw table has been compiled from the field data sheets and checked, no further errors should occur, which is a common fault of rewriting and rearranging tables manually. The immediate changes and production of printouts makes this system more versatile than mainframe computer manipulating procedures. Moreover, the end product is a table which is in a form suitable for publication.

Acknowledgements

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