THE EFFECTIVE AGRICULTURAL KNOWLEDGE PRESENTATION

V. Vostrovský

Czech University of Life Sciences, Faculty of Economics and Management, Department of Information Engineering, Prague, Czech Republic

This paper describes single-hit decision tables role in knowledge engineering. These tables can be widely used in many agricultural knowledge-based systems. They are another technique used for knowledge representation and consist of some conditions, rules and actions. This format is also readily readable and editable by non technical users. Decision tables allow relatively complex logical relationships to be represented in an easily understood form and processed efficiently. They can serve as a good development tool, a good documentation tool and a good visual explanation.

knowledge; decision tables; tabular representation; knowledge representation

INTRODUCTION

Recently, some professionals have formulated a prediction that in the near future, the value of land and capital will be superseded by the value of knowledge, which will thus become the wealth of the respective owner. Managers of leading companies are therefore starting to fully appreciate the value of knowledge and skills of the transferring this knowledge further. The knowledge in this context can be interpreted as the full utilization of information and data, coupled with the potential of people's skills, competencies, ideas, intuitions, commitments and motivations. It will be similar under the conditions of Czech agriculture. There is a range of troubleshooting domains which require saving the knowledge and eventually, if need be, expert consultation or resolution. This knowledge can be saved and distributed by means of the knowledge bases. The fundamental question is, which way the knowledge is represented. One of the possible knowledge representations may be the decision tables.

Decision tables are another technique used for knowledge representation and consist of some conditions, rules and actions. This format is readily readable and editable by non technical users. The decision tables are a tabular form that presents a set of conditions and their corresponding actions. They can serve as a good development tool, a good documentation tool and a good visual explanation.

MATERIAL AND METHODS

Decision tables typically consist of the following parts, as shown in Fig. 1.

Table header contains the name of the decision table. Condition stubs describe the conditions or factors that will affect the decision or policy. They are listed in the upper section of the decision table. Each condition corresponds to a variable, whose possible values are listed among the condition alternatives. Some decision tables use simple true/false values to represent the alternatives to a condition, other tables may use numbered alternatives, and some tables even use fuzzy logic or probabilistic representations for condition alternatives. Action stub contains the consequent actions. They are listed in the lower section of the decision table. Each action is a procedure or operation to perform, and the entries specify whether (or in what order) the action is to be performed for the set of condition alternatives the entry corresponds to (K i n g , 1966). The number of conditions determines the number of rules that are required to provide an analysis of all possible combinations of conditions. The rules inside decision tables are executed one-by-one in the order they are placed in the table (C h v a l o v s k ý , 1974). The execution logic of one rule is the following:

IF ALL conditions are satisfied THEN execute ALL actions.

Table header	Rules							
	1	2	3	4	5	6	7	8
Condition stubs: condition 1	Y	Y	Y	Y	N	N	N	N
condition 2	Y	Y	N	N	Y	Y	N	N
condition 3	Y	N	Y	N	Y	N	Y	N
Action stubs: action 1	X		X		X	X		X
action 2		X	X	X			X	X

Fig. 1. Basic form of the decision tables

Table header					
Rules	Condition 1	Condition 2	Condition 3	Action 1	Action 2
1	Y	Y	Y	X	
2	Y	Y	N		X
3	Y	N	Y	X	X
4	Y	N	N		X
5	N	Y	Y	X	
6	N	Y	N	X	
7	N	N	Y		X
8	N	N	N	X	X

Fig. 2. Horizontal format of the decision tables

Decision tables can be created in vertical (as in examples above where concrete rules go vertically one after another) or horizontal format, where conditions and actions are located in the rows and the rules themselves go into columns. For the default vertical decision tables, all rules are executed in the top-down order and for horizontal decision tables, all rules (columns) are executed in left-to-right order. When a decision table has too many rules, it is better to use the horizontal format (Fig. 2).

RESULTS AND DISCUSSION

During the generation of the decision table it is necessary to determine the maximum size of the table, to eliminate any impossible situations, inconsistencies, or redundancies, and simplify the table as much as possible. These matters can be realized by the following procedure:

1. **Determination of the number of conditions that may affect the decision**
   The number of conditions becomes the number of rows in the top half of the decision table. Let's assume the following simple example from apicultural area: REQUEENING INTO COLONY.
   If it is early spring, then requeening into colony is relatively easy. In this example it can be requeening into colony by means of the cage. If it is early spring and time of the queenless is short, then requeening into colony without the cage. If interval of the queenless is long, then the requeening is complicated. If laying worker in the colony, then requeening is too complicated, requeening by means of the ethyl alcohol. In all cases it can be clear out the queen cell.
   In the above-mentioned example the following actions can be determined:
   Condition 1: **Early spring?**
   Condition 2: **Short time of the queenless?**
   Condition 3: **Laying worker in the colony?**

2. **Determination of the number of possible actions that can be taken**
   This becomes the number of rows in the lower half of the decision table. In our example the following actions can be determined:
   Action 1: **Clear out the queen cell**
   Action 2: **Requeening without the cage**
   Action 3: **Requeening by means of the cage**
   Action 4: **Requeening by means of the ethyl alcohol**

3. **Determination of the number of condition alternatives for each condition and calculation the maximum number of rules in the decision table by multiplying the number of alternatives for each condition**
   In a bivariate decision table, conditions are binary, restricting condition evaluations to "yes" and "no". This results in a number of columns equal to $2^{\text{number of conditions}}$. If in the above-mentioned example were 3 conditions and two alternatives (Y or N) for each of the conditions, there would be eight possibilities, i.e. the maximum number of rules is $2^3 = 8$. This becomes the number of rows in the lower half of the decision table.

4. **Filling in the conditions alternatives**
   Starting with the first condition it is necessary to divide the number of columns by the number of alternatives for that condition. In our example, there are eight columns and two alternatives (Y and N), so eight divided by two is four. Then choose one of the alternatives and write Y in all of the four columns. Finish by writing N in the remaining four columns. Repeat this for each condition using a subset of the table.

Requeening INTO COLONY	1	2	3	4	5	6	7	8
Condition 1: Early spring?	Y	Y	Y	Y	N	N	N	N
Condition 2: Short time of the queenless?	Y	Y	N	N	Y	Y	N	N
Condition 3: Laying worker in the colony?	Y	N	Y	N	Y	N	Y	N
Action 1: Clear out the queen cell								
Action 2: Requeening without the cage								
Action 3: Requeening by means of the cage								

5. **Completing the table by inserting X where rules suggest certain actions**
In this step be need to provide, which actions are appropriate for each combination of condition attribute values and mark X in that column of the action row. This should be fairly straightforward if the decision-making procedure is well defined.

Requeening INTO COLONY	1	2	3	4	5	6	7	8
Condition 1: Early spring?	Y	Y	Y	Y	N	N	N	N
Condition 2: Short time of the queenless?	Y	Y	N	N	Y	Y	N	N
Condition 3: Laying worker in the colony?	Y	N	Y	N	Y	N	Y	N
Action 1: Clear out the queen cell		X		X		X		X
Action 2: Requeening without the cage		X						
Action 3: Requeening by means of the cage				X		X		X
Action 4: Requeening by means of the ethylalcohol	X		X		X		X	

6. Simplification of the decision table

During this step it is necessary to combine rules where it is apparent that an alternative does not make a difference in the outcome. For example:

Condition 1	Y	Y
Condition 2	Y	N
Action 1	X	X

→

Condition 1	Y
Condition 2	–
Action 1	X

The dash (-) or "don't care" signifies that condition 2 can be either Y or N and action will still be taken. This means that the condition in that row does not affect the action to be taken. Each "don't care" reduces the number of columns necessary and increases the comprehensibility of the table. In this example the $2^3 = 8$ possible combinations are reduced to 3. The revised table is as follows:

Requeening INTO COLONY	1	2	3
Condition 1: Early spring?	–	Y	–
Condition 2: Short time of the queenless?	–	Y	N
Condition 3: Laying worker in the colony?	Y	N	N
Action 1: Clear out the queen cell		X	X
Action 2: Requeening without the cage		X	
Action 3: Requeening by means of the cage			X
Action 4: Requeening by means of the ethylalcohol	X		

7. **Checking the table for any impossible situations, contradictions, redundancies with the end-user or expert**
In this step it is necessary to eliminate impossible rules, and also combine rules with indifferent conditions. An indifferent condition is one whose values do not affect the decision and always result in the same action. Impossible rules are those in which the given combination of condition attribute values cannot occur according to the specifications of the problem. To determine indifferent conditions, first look for rules with exactly the same actions. There appear to be no impossible rules.

8. **Conversion of the created decision table to a decision tree or source code**
When designing or generating a full knowledge based application, conditions, condition states and conclusions have to be transformed to the available modelling facilities. A major issue, however, is how to implement the decision logic. The implementation of the decision logic can be realized in two different ways, depending on the problem characteristics. Firstly, it is possible to convert the decision tables to a decision tree or to code using a nested if-then-else structure. The second way of implementing the decision tables is to convert them to a set of rules. Of course, a combination of both can sometimes be useful.

– *Conversion of decision tables to a decision tree or code*

Knowledge can often be transformed into a tree structure. The decision table might then be transformed into a nested if-then-else structure, where the outcome of the decision is obtained by repeatedly choosing the appropriate branch in a selection. Within this option, several types of trees might be the result of the conversion: from naive to optimal execution trees, where the latter constitute a more complex optimization challenge (V a n - t h i e n e n , W e t s , 2005).

The corresponding tree structure can be as follows:
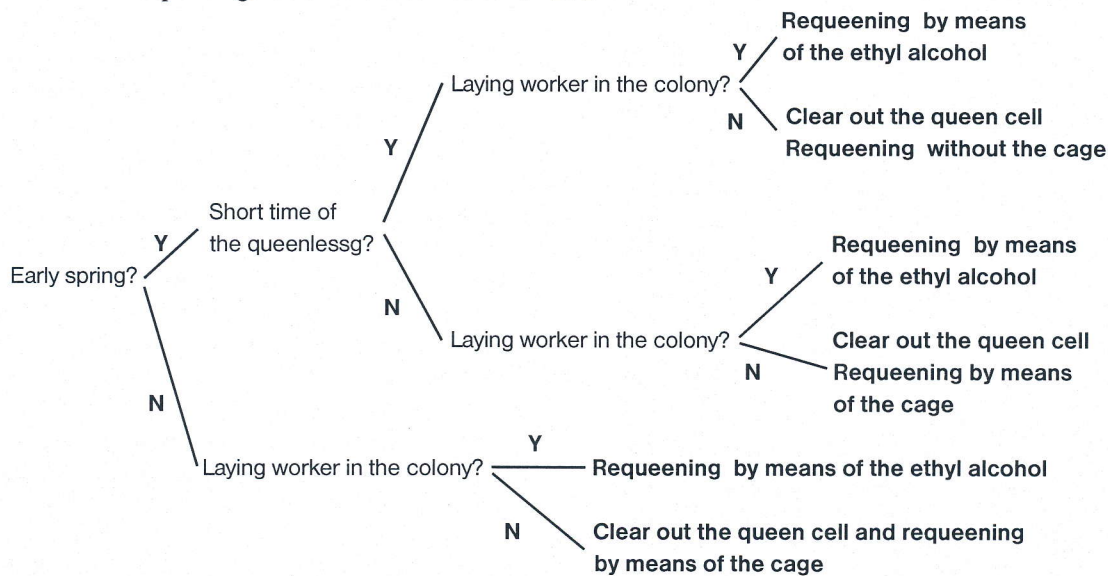
The corresponding source code (e.g. Visual Basic) can be as follows (K o c h , 2003):

```
cond_combination = (condition1*2²) + (condition2*2¹) + (condition3*2⁰)
Select Case cond_combination
    Case 1 'Requeening by means of the ethyl alcohol'
    Case 6 'Clear out the queen cell and requeening without the cage'
    Case 0 'Clear out the queen cell and requeening by means of the cage'
End Select
```

The explicit felicity of this source code is its briefness, lucidity and simplicity.

– *Conversion of decision tables to a set of rules*

In a lot of cases, conversion to a decision tree is not flexible enough to deal with the knowledge in the knowledge base. When a tree is used as representation mechanism, one might run into problems, e.g. with unknown values, multiple answers to a question, links to other parts of the knowledge base, flexibility of the reasoning process, etc. This does not imply that the application area of tree structures is small or unimportant. Indeed a large number of specifications can easily be represented in a tree format, even if the knowledge was originally acquired in the form of rules (and transformed to a tree or table format). But in some cases, more flexibility is required, and rules may constitute the more suitable representation formalism. Several alternatives to transform the decision table into a set of rules are available, from a naive column-by-column translation to more optimal forms (V a n - t h i e n e n , W e t s , 2005).

Columns inside in the revised table with three rules can then be read like:
1. rule: IF "Laying worker in the colony?" is "Yes" THEN "Requeening by means of the ethyl alcohol".
2. rule: IF "Early spring?" is "Yes" and "Short time of the queenless?" is "Yes" and "Laying worker in the colony?" is "No" THEN "Clear the queen cell and requeening without the cage".
3. rule: IF "Short time of the queenless?" is "No" and "Laying worker in the colony?" is "No" THEN "Clear the queen cell and requeening by means of the cage".

9. **The integration of the table representation knowledge into the corresponding knowledge-based system**

Dialogue between the user and this system destined to find suitable appending of the queen into colony can be the following history:

System: **Early spring?**
User: **Yes**

System: **Short time of the queenlessing?**
User: **Yes**
System: **Laying worker in the colony?**
User: **No**
System: **Based on your answers, I recommend the following:**
Clear out the queen cell and requeening without the cage

CONCLUSIONS

Generally, in the context of knowledge-based systems can be the decision tables used efficiently and effectively above all during the verification and validation process. They offer concerned the locking of the next matters:

– **Completeness**
Knowledge bases often suffer from missing attribute values or combinations of attribute values and un-reachable conclusions. The principle of the single-hit decision table easily allows checking for complete-ness, because the number of simple columns should equal the product of the number of states for every condition.

– **Consistency**
Inconsistency occurs when rules with the same premises but different conclusions exist. When these conclusions are contradictory, the rules are in **conflict**. If the contra-dictory conclusions deal with opposite values of the same action, this will be called **contradiction**. When the con-clusions do not necessarily contradict each other, the rules are **ambiguous.** Because in a correct decision table all columns are non-overlapping and each column refers to exactly one configuration of conclusions, inconsistency between columns will not occur.

– **Non-redundancy**
Single hit decision table eliminates redundant rules and premises, as a combination of condition states will be included in only one column

– **Correctness**
After the decision tables have been designed, the knowledge engineer may want to check the (semantic) correctness of the decision specification, verifying that for each possible case the right action(s) will be exe-cuted. The decision table format easily allows this kind of validation (N g u y e n et al., 1996).

Decision tables also offer system analysts the possibil-ity of eliminating inconsistencies and redundancies in each set of specified knowledge. They allow relatively complex logical relationships to be represented in an easily under-stood form and processed efficiently. This table represen-tation also enable the system analyst to determine if he has considered all the possible decision rules that can be formed from a particular set of conditions. This table rep-resentation offers the following advantage:

– **transparent knowledge representation,**
– **errors prevention,**
– **optimal knowledge organisation,**
– **checking for completeness and consistency can al-ready be performed during the design of the know-ledge-based system.**

REFERENCES

CHVALOVSKÝ. V.: Rozhodovací tabulky (Decision tables). Praha, SNTL 1974.
KING, P. J. H.: Conversion of Decision Tables to Computer Pro-grams by Rule Mask Techniques. Comm. ACM, 9, 1966: 796.
KOCH, R.: Decision Tables and Visual Basic, 2003. http://www. romankoch.ch/cgi-bin.
NGUYEN, T. – PERKINS, W. – AFFEY, T. – PECORA, D.: Knowledge Base Verification. AI Magazine, 8, 1996 (2).
VANTHIENEN, J. – WETS G.: Mapping Decision Tables to Expert System Shells: An Implementation in AionDS. Re-search Paper 9228. K.U.Leuven, 1992.

VOSTROVSKÝ, V. (Česká zemědělská univerzita, Fakulta provozně ekonomická, katedra informačního inženýrství, Praha, Česká republika):

Efektivní reprezentace zemědělských znalostí.

Článek se zabývá uplatněním tzv. single-hit rozhodovacích tabulek ve znalostním inženýrství. Tento nástroj před-stavuje tabulkové vyjádření množiny podmínek a jím odpovídajících akcí ve formátu, který je velmi dobře čitelný a edivatelný nejen pro technického uživatele. Rozhodovací tabulky reprezentují poměrně komplexní logické vztahy v snadno srozumitelném a efektivně zpracovatelném tvaru. Mohou tak sloužit jako velmi dobrý vývojový a dokumen-tační nástroj s vynikající názorností. Takovéto tabulkové reprezentace znalostí mohou najít široké uplatnění v mnoha zemědělských znalostních systémech.

znalost; rozhodovací tabulky; tabulková reprezentace; reprezentace znalostí

Contact Address:

Dr. Ing. Václav V o s t r o v s k ý, Česká zemědělská univerzita v Praze, Fakulta provozně ekonomická, katedra informačního inženýrství, Kamýcká 1076, 165 21 Praha 6-Suchdol, Česká republika, tel.: +420 224 382 386, e-mail: vostrovsky@pef.czu.cz

Prof. Dr. Techn. Ing. Václav Korf, DrSc.

In 2007, we commemorate the 100th anniversary of the birth of Prof. Dr. Techn. Ing. Václav Korf, DrSc. (born on 20 July, 1907; died on 5 January, 1985). Prof. Korf ranks amongst a few unique personalities in the Czech forestry, whose work is of high scientific, pedagogic and also practical esteem. He epitomizes the Czech, European and world forestry of the past as well as of the early XXI century, despite his isolation from the greater part of the world, forced by the prevailing pressures of the times he spent most of his life in. We commemorated the 20th anniversary of professor's death at a special conference organised by the Faculty of Forestry and Environment of the Czech University of Life Sciences in Prague on 31 May, 2005. In the proceedings from this conference the reader can find the majority of references presented here, the rest of which can be found on the Forest Management Department website.

Prof. Dr. Techn. Ing. Václav Korf, DrSc., was born in the family of railway carpenter in Hřebečníky, the Rakovník district. He graduated cum laude from the Higher Forestry School in Hranice (1927) and from the forestry branch of the Czech Technical University (VŠZLI ČVUT) in Prague (1931), also cum laude. Consequently, he worked as an assistant professor there. He became doctor of technical sciences (Dr. Techn.) at his alma mater in 1935. In 1939, when all Czech universities were closed, he became mensurationist on the estates of the Prague land archiepiscopate. After 1945 he worked as a forestry clerk there and later became general manager of the whole archiepiscopal land estates. In 1945, he started to lecture at the University again, and was awarded veniae docendi (associate professor) in 1946. In 1954 he became professor of forest management and forest mensuration of the Faculty of Forestry of the Czech Technical University in Prague. He was a vice-dean for two years, and then the dean of this faculty for another nine years, to 1963. In 1962 he received the scientific degree of doctor of agricultural and forestry sciences (DrSc.). In the years 1966 to 1970 he was vice-chancellor for scientific and research work of Agricultural University in Prague. In 1974 he changed over to University of Forestry and Wood Sciences in Zvolen, Slovak Republic, where he worked until 1983. Prof. Korf died in Prague from a severe disease, in full consciousness, thinking of his close relatives, his alma mater, department and his beloved work, to which he devoted all his life. The curriculum vitae of the honourable Prof. Korf could be written only in a brief version here, but further information is available in CVs elaborated by an academician of the Czechoslovak Academy of Sciences, Prof. Dr. Ing. Miroslav Vyskot, DrSc. (1977, 1985), and by Dr. Ing. Jaroslav Řehák, CSc. (1982).

Prof. Korf left behind him an extensive scientific work. He contributed to the development of mensuration methods, forest biometry, science of forest production and forest management. He was among the first post-war authors of textbooks in these branches, which was appreciated not only in the Czech Republic but also abroad (Husch et al., 1963, 1972; Kurth 1994; Pardé 1961; Prodan 1961, 1965, 1968).

In his numerous works Prof. Korf was dealing with the theory of growth of forest trees and stands, and with the use of the differential equations, forestry biometry, relationships between basic assessment variables, problem of determination of common growth, forest management systems and other issues. The world-wide reputation reached his growth function – Korf (1939):

$$V_t = A \cdot \exp\left(\frac{k}{(1-n) \cdot t^{n-1}}\right)$$

where A, k, n are parameters of this function, t is age in years.

The sources of his work were publications of Dr. Ing. Bedřich Rychlý (1933) – a later professor of the University of Agriculture, Prof. Dr. Alexander Petrovič Van der Vliet (1921, 1934, 1935, 1937) from the Czech Technical University in Prague, Dr. Fedor Korsun (1935) from Brno, works of Dr. Peschel (1938) from Tharandt, who summed up growth functions known at that time, then the works of Hohenadl (1923, 1924), Guttenberg (1915) and the data in the Gerhardt (1930) tables, who tested the derived growth function. Prof. Korf elaborated and developed his growth function and theory in numerous works. He (1967) studied the problems of asymmetry of increment function (first derivation) in association with Backmann's works (1941, 1943) and proved that the asymmetry of increment function is caused by the asymmetry of the values on the y-axis, which means that the increment is falling slower

after its culmination than it was increasing before. He showed that his function suits to all requirements, which were determined by Backmann. Even at present, Backmann's works belong to fundamental sources in modern science, though the problem of existence of organic (or biological) time has not yet been successfully settled. These issues have a deep philosophical, generally scientific and biophysical significance, and they imply interrelation with concepts of the development of the world (universe) outlined by Lorentz, Einstein and Minkowski. The Korf function is based on the integration of differential equation, expressing the development of growth intensity by hyperbolic power function, and we dare hope that it also suits the above mentioned concepts (Minkowski hyperbolic world line).

Works of Prof. Dr. Branislav Sloboda, Dr.h.c. (University Goettingen, 1971), Prof. Dr. Jáchym Hradecký (Freiburg, 1972), Dr. Richard Žarnovičan (1979) from Canada, followed by Kiviste's (1988, 2002) treatises (where this function is presented in a form hardly recognisable at first sight as Kiviste strove for some sort of generalisation), then the textbook of Prodan et al. (1997) published in Costa Rica, and especially works of Zeide (1972–2005) from USSR and USA – all these publications contributed to introducing and appraising the Korf growth function abroad.

Prof. Dr. Boris Zeide (1993) from University of Arkansas, Monticello, USA, who has been the most cited author in this branch, appreciates the Korf function as the best of the three-parameter ones. He reports that it was designed in Czechoslovakia and re-discovered several times since then – e.g. by Lundquist (1957), Stage (1963), Brawer et al. (1985) – and was successfully used for modelling height growth of forest stands. With the function, he achieved best results of all the other usable functions in modelling thick growth on empiric material out of thousand stem analyses in different parts of the USA. Prof. Dr. A. K. Kiviste from Agricultural University in Tartu (Estonia), among others, wrote (1988) that the Korf growth function was used in Anglo-American researches (Bailey and Clutter, 1974; Kilpatrick, 1981). Kiviste et al. (2002) reported that it was used in the reconstruction of many growth tables in Spain – under the Schumacher label (1939) – in the form presented by Lundquist (1957), and in addition under Bailey and Clutter label (1974). Calama et al. (2003) classifies the Korf function as a very well known growth function and the Bailey and Clutter function (1974) as its form. Korf's use of his function to formulate the development of tree height (h) in dependence on the calculated diameter ($d_{1,3}$) from his forest mensuration textbook (1953) is in the focus of interest of many scientists all over the world. Mehtätalo (2004) from Finland states (and supports by citations) that *"a commonly used function the H-D curve is the Korf function"*. Statements like this are a great appreciation of the Korf's work and its qualities. This function was tested for fast-growing tree species – poplar plantations in Italy or eucalyptus plantations in Portugal with the rotation period of 10 to 12 years or 12–17 years and in all age groups interval also

for the old growth forests. Zhang (1997), in his empiric material, includes also *Abies grandis* with the height of 72.9 m and *Thuja plicata* with $d_{1,3} = 252.7$ m. The number of tree species, for whose growth the Korf function was used, nears a hundred. The publications of Dr. Sylvie Gourlet-Fleury (1995, 2005) from France (Guyane Française), devoted to modelling of growth and production of commercial tropical rain forests, also belong to very interesting works using the Korf function.

Practical experience from our department can be summed up in the following way: the Korf function belongs to one of three-parameter functions, with which we reach the best results. Sometimes it gives a high estimation of asymptote, nevertheless, also in the latter case is suitable for extrapolation. Excellent results were also reached with the Weibul function (1939) and Chapman-Richards (1961, 1959), though it seems that they give a little lower asymptote, in the respective order. The Chapman-Richards function seems to be less suitable for extrapolation than the Korf function.

Prof. Korf's results and wide public acceptance can easily be documented and evaluated as a large number of other scientists used the Korf growth function as the basis of their scientific work or they comprised it into closer selections of growth functions or presented Korf's work in some other way. The principal list of works and references is given in the Korf SCI index and in the SCOPUS database. The Korf function was used by many authors from abroad, namely **Estonia**, **Finland**, Ireland, **Italy**, **France**, **Germany**, Norway, Poland, **Portugal**, Austria, Rumania, **Slovakia**, **Spain**, **Sweden**, Great Britain, **Canada**, **USA**, Mexico, Costa Rica, **French Guiana**, India, **China** and New Zealand (countries, from which is the greatest response or they present extensive and interesting results, are published in bold). The Korf function and other works are cited and used in 15 journals with SCI index, e.g. **Annals of Botany**, **Wood and Fiber Science**, in 50 papers, out of it in 27 after the year 2001. The Korf function is mentioned most frequently in the **Canadian Journal of Forest Research** (13 times) and in the **Forest Ecology and Management** (10 times). The Korf function was used by many distinguished scholars of world universities: Harvard University, Universities in Arkansas, Michigan, New York, Wisconsin, Quebec and Montreal, Universities of Göttingen and Freiburg, Technische Universität in Munich, University in Nancy, Madrid, Santiago de Compostela, Technische Universität in Dresden, Technical University in Zvolen etc.

Prof. Korf dealt with various issues of the Czech forestry, including practical aspects of forest management. He always approached fundamental and conception tasks with a great seriousness, responsibility and prudence. He was always aware of the fact that every significant decision in forestry has its long-time consequences, going beyond the time span of several human generations, as it results from the very substance of the forest and forestry. It was manifested e.g. in his views of the forest management systems. His learning and accomplishments together with warm personal contacts with leading scientists of the

whole Czechoslovakia, representatives of the Czech art and culture also contributed to the thoroughness of his work and attitudes.

To conclude, it can be said that Prof. Korf's work is a firm component of the Czech history and world forestry, and above all, it is an outstanding and strong part of current Czech forestry science. Appreciation of his work is sufficiently manifested by the fact that his function is used in many works dealing with the formation of growth tables, analysis and modelling of growth process, in a lot of monographs and textbooks. Korf growth function brings satisfactory results to many scientists and some of them take it as sound basis for their works. Important, though at the same time unfortunate, is the fact, that a great majority of Korf's works was published after his death (108 works out of all 125), 61 of them as late as in the first years of this century. It is a pity that Prof. Korf did not live to see the reputation of his work. Forestry scientists and specialists owe him a lot. No author has yet tried to further develop Korf's ideas from his work published in 1974, devoted to differential equations in growth theory (maybe

with the exception of Hamlin and Leary /1987/ from USA) and works devoted to the use of the Fourier series in formulation of growth process, compiled together with Prof. Dr. Milan Mikan, dean and head of the department of mathematics at our Technical Faculty of the Czech University of Life Sciences in Prague (Korf, Mikan, 1967). Therefore, let us conclude our reminiscing with Dr. Žarnovičan who said that we should feel obliged *"to spread and know the work of the great forester, Prof. Václav Korf"*, as well as the work of scientists of all-over the world who use his results, develop his concepts and never cease to test them.

REFFERENCES

KOUBA, J. – ZAHRADNÍK, D.: The Korf growth function of 1939 – use in forestry science, its response and position in the world. In: Growth functions in forestry. The Korf growth function and its use in forestry and response in the world. In: Proceedings of the Conference, FLE of Czech University of Agriculture in Prague, 31 May, 2005: 7–24.

Prof. Ing. Jan K o u b a , CSc.
Faculty of Forestry, Wildlife and Wood Sciences, Czech University of Life Sciences Prague, Czech Republic