XPLOT: IMAGERY FOR PRUNED LOG SALES

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ABSTRACT

Marketing of pruned conifer logs is assisted by adequate log description, which must feature internal as well as external log characteristics. The existing cross-sectional analysis system provides very detailed log descriptions with important characteristics defined using three-dimensional co-ordinates. XPLOT is a software package that uses this information to print scale diagrams, showing (a) median longitudinal sections of a sample log, in two planes, and (b) superimposed cross-sections. Characteristics shown in these images should enable buyers to rapidly assess log quality.

INTRODUCTION

New Zealand's 1 million hectare exotic forest estate now includes significant volumes of pruned butt logs. Successful marketing of these logs, at prices satisfactory to both grower and buyer, depends on adequate log quality description. The quality of sale lots can vary greatly, due largely to variation in internal log features invisible in the intact log. Therefore, the description must consider internal, as well as external, log properties (Somerville *et al.*, 1985).

For the processes of sawing, peeling, and slicing, the quality of the pruned log is dependent on: the external shape and dimensions of the log, the location of pith, the location and dimensions of pruned branch stubs and associated occlusion scars, the presence of adventitious shoots, and the location and presence of scattered defects such as resin pockets and stem damage.

An image of a pruned log showing the incidence and location of all the above features should provide adequate information to enable a wood processor to anticipate that log's grade and conversion performance. Extending this reasoning, if the processor were supplied with imagery of a representative sample of logs from a large batch of pruned logs (*e.g.*, those in a log sale) he would be better informed as to the worth of the batch. This would eliminate some elements of risk and assist the processor in negotiating a satisfactory price.

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The cross-sectional analysis system (Somerville, 1985) provides a mathematical description of pruned log external and internal characteristics, with important characteristics defined in three-dimensional co-ordinates. Programme XPLOT is a software package which adds to this system, by plotting these data to produce computer-generated line diagrams. From these images a visual assessment of quality can easily be made.

XPLOT

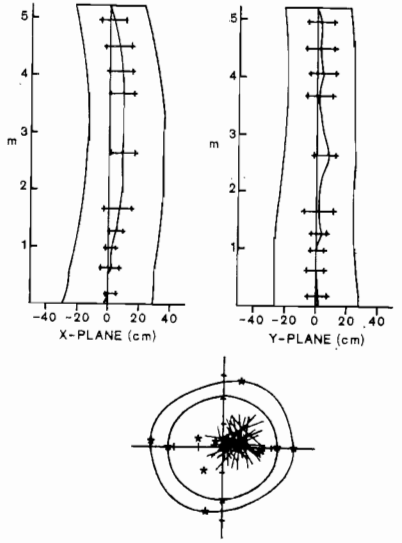
XPLOT is written in FORTRAN 4 and is currently on the New Zealand Forest Service's PDP 11/34 computer at the Forest Research Institute. It is planned, initially, to release this program (along with other software relevant to pruned log quality evaluation) on the New Zealand Forest Service's VAX computer system. Although XPLOT has been designed primarily for use with cross-sectional analysis, it could potentially be used with data from the sawing study method of Park and Leman (1983).

Out put from XPLOT is a print out comprising three different images of a log (see sample output in Fig. 1A). The first two are median longitudinal sections, showing log underbark profiles through two planes (X and Y) at right-angles. One of these (X in Fig 1A) is the plane of maximum sweep. These profiles include the pith and projections of branch stubs plus occlusions. [Branch stubs are represented in the plot by horizontal lines ending at vertical dashes. Occlusions, derived from branch measurements (Park, 1982), are represented by further horizontal dashes.] The third image is a telescoped cross-section, showing the large and small end underbark perimeters superimposed. Branches and resin pockets are portrayed in the exact position measured in the field. [Branches plus occlusions are represented by straight lines radiating out from the centre of the pith and resin pockets by asterisks.]

The actual external appearance of the log represented in Fig. 1A can be seen from photographs (Fig 1B) which were taken from the corresponding X and Y planes before the tree was felled. The lower illustration is a photograph of the log large end. Taking into account the accentuated curvature caused by the smaller scale used in the plot, it shows a very good representation of the outside of the real log.

DISCUSSION

The prospectus for a sale of pruned logs should include a description of log quality which features internal, as well as external,



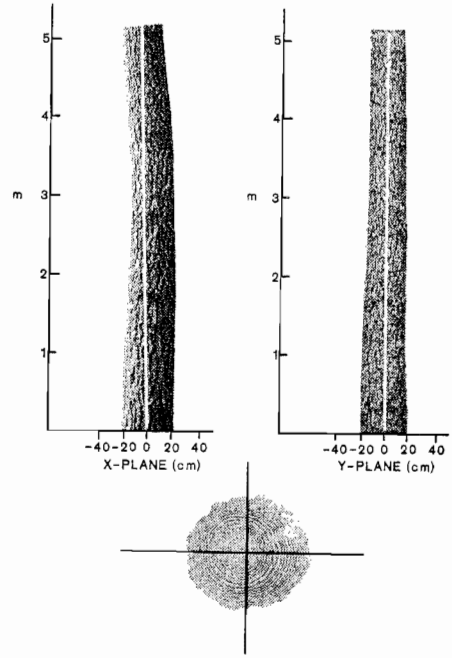


FIG 1

A: *Sample output from XPLOT for Kaingaroa tree 8/7 (5.20 m)*

B: *Kaingaroa tree 8/7 (N.Z. Forest Service photo)*

log characteristics. Currently two different approaches are used to define quality of a sale lot. Briefly these are:

(a) Measurement-based: the quality of the stand or batch is inferred from an examination of sample logs, and
(b) Predictive: log properties are predicted from a knowledge of stand history.

Provided these descriptions are based on adequate data, they substantially reduce uncertainty and risk to the buyer and therefore facilitate price setting and marketing.

Using available measurement techniques, the characteristics of sample logs can be very accurately described; the degree to which these descriptions are representative of a large sale lot therefore depends on the intensity of sampling. Further work is being carried out to determine the most suitable sampling technique and sample size for practical use.

The parameter diameter over stubs (DOS) has been commonly used to indicate the maximum reach of branch stubs and also more generally as an index of log quality. This parameter can be predicted from stand history (Knowles *et al.*, in prep.), but an accurate prediction does require adequate records. In practice, stand histories are often unavailable or only partially recorded; this can result in considerable predictive error. In addition, for some types of processing, log quality depends on more than DOS alone. Examples of other important log features are resin pocket incidence and the positioning of branch stubs in relation to the central log axis. When (a) stand histories are lacking, (b) the financial risk associated with errors in prediction is too great, or (c) high detail is sought, then internal log description must be provided by measurement.

There are two measurement methods for obtaining detailed log feature descriptions: the cross-sectional analysis system (Somerville, 1985) and the sawing study method (Park and Leman, 1983). Both procedures enable a three-dimensional "mapping" of features determining log quality. These measurement systems are free from any prediction mechanism and prior knowledge of stand histories is not required. XPLOT provides a simple visual presentation of these detailed mathematical descriptions. In terms of log quality definition, XPLOT imagery can either stand alone, or serve to complement predictions of grade and conversion.

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