

SHORT NON-REFEREED PAPER

## OPTIMUM HARVEST AGE IN RAINFED REGIONS: INTERACTIONS BETWEEN VARIETY, AGE AND *ELDANA* *SACCHARINA* (LEPIDOPTERA: PYRALIDAE) DAMAGE

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### Abstract

The release of earlier maturing varieties, the desire to increase harvest age, and the impacts of *Eldana saccharina* (eldana) on aged cane have created uncertainty around the optimal harvest age in rainfed regions. The objectives of this study were to (i) revisit the optimal harvest age of cane in rainfed regions, (ii) illustrate the effects of variety choice on optimal harvest age and (iii) explore interactions between eldana damage, harvest age and variety choice. Using a data mining approach, variety trial data from 2000 to 2013 were categorised by region, harvest age, variety and variety eldana resistance category (resistant vs susceptible). Recoverable value (RV) yields and percentage internodes damaged (%ID) were plotted against harvest age to investigate effects of region, variety, eldana resistance and their interactions. On average, the optimal harvest ages along the coast and inland regions were 15 and 22 months, respectively. Newer varieties such as N31 and N41 showed faster growth rates than N12 and their optimal harvest ages should be reduced accordingly. The optimal harvest age of a specific variety varied by region, illustrating that a generic optimal harvest age for a particular variety cannot be recommended. As a group, eldana resistant varieties outperformed susceptible varieties when aged over 13 months along the coast. The %ID was 4.1% compared with 3.1% per month of growth for susceptible vs resistant variety groups along the coast, respectively. The data mining approach was valuable in extracting key trends and best management practices relating to variety choice, harvest age and eldana control.

*Keywords:* eldana, harvest age, sugarcane, variety

### Introduction

The optimal age to harvest cane in the coastal and inland (midlands) regions has traditionally been around 18 to 24 months, respectively. However, infestations of *Eldana saccharina* Walker (Lepidoptera: Pyralidae) (eldana) have forced growers along the coast to reduce harvest age to 12 months, thereby reducing potential yields. Given the current economic constraints, these growers are considering reverting back to the harvest age of 18 months, with the associated use of an insecticide to allow for carry-over of cane without substantial yield loss. The current suite of varieties available is now more comprehensive than in the past, when the 18-month cutting cycle dominated. Over the last decade or so, the South African Sugarcane Institute (SASRI) has released a number of faster maturing varieties that avoid eldana damage along the coast. There is therefore uncertainty around the optimal harvest age in these rainfed regions with the release of the new varieties. The objectives of this study were (i) to revisit the optimal harvest age of cane in rainfed regions; (ii) to illustrate the effects of variety choice on optimal harvest age and (iii) to explore interactions between eldana damage, harvest age and variety choice.

## Materials and Methods

Using a data mining approach, variety trial data from 2000 to 2013 were extracted from the variety evaluation project database and categorised by region (coastal and inland), harvest age, variety and variety eldana resistance category (resistant vs susceptible). Average recoverable value (RV) yields were plotted against harvest age at regional levels, and per variety within region. The RV yields were also investigated in relation to harvest age for resistant and susceptible variety groups. Eldana damage, measured as average % internodes damaged (%ID) was also plotted against harvest age for resistant and susceptible variety groups in the coastal region.

## Results

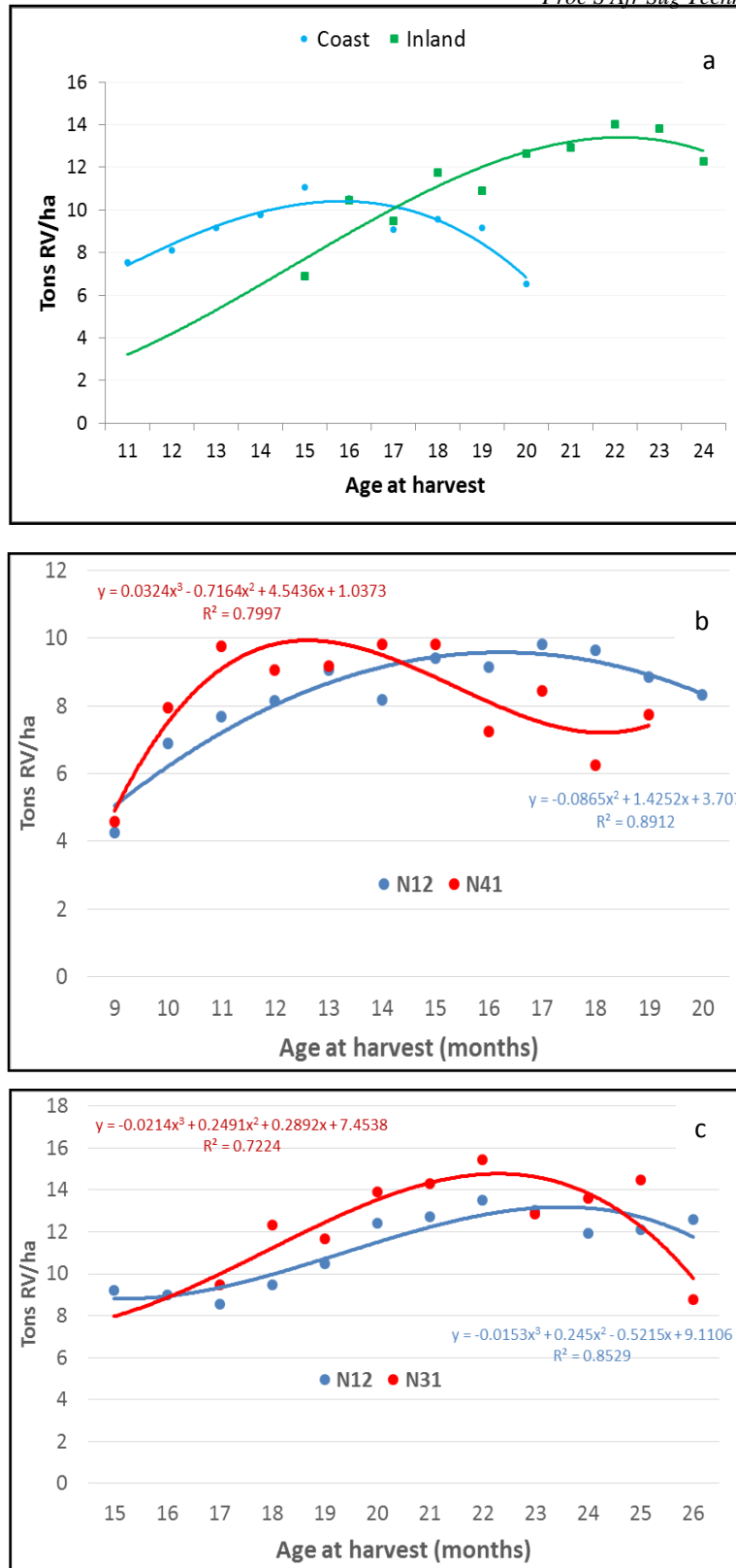
### *Optimal harvest age in different regions and variety x harvest age interactions*

When averaged across varieties, the optimal harvest age along the coast was found to be around 15 months (Figure 1a). Beyond this age, RV yields tend to decline. This may be associated with increasing eldana damage. For inland conditions, the optimal harvest age was around 22 months (Figure 1a).

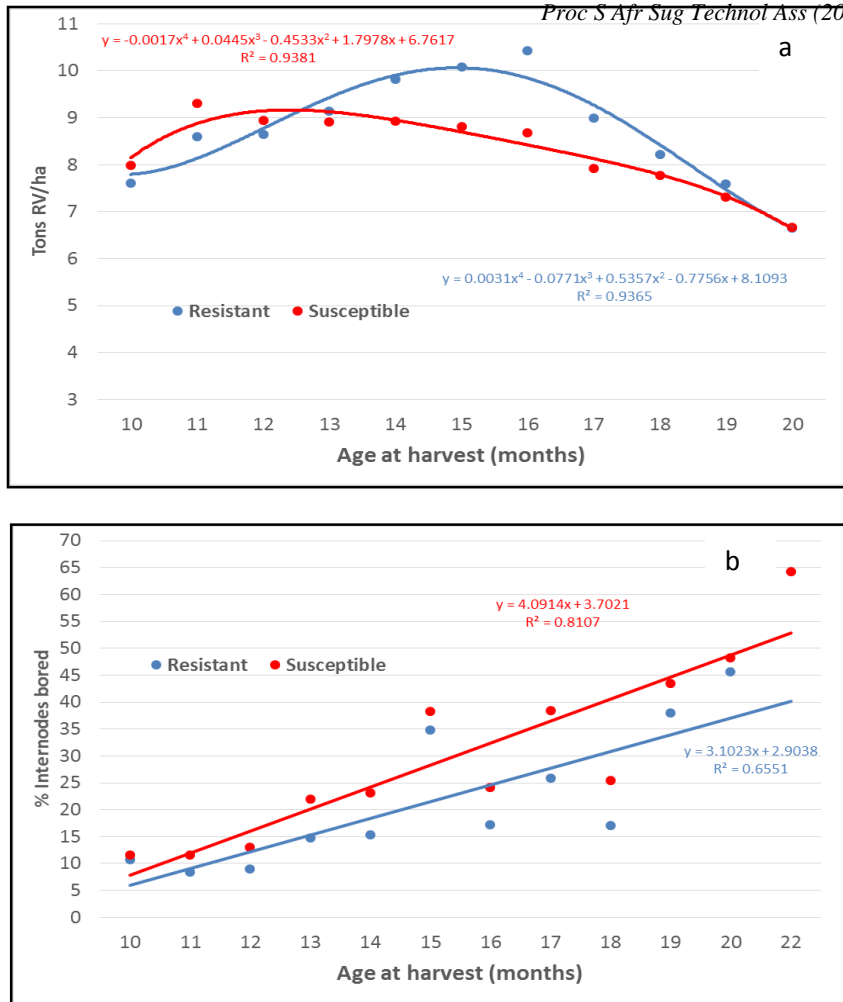
Although Figure 1a shows that the optimal harvest age along the coast should be around 15 months, this general recommendation is largely influenced by variety choice. Figure 1b shows the RV yields of N41 (a newer variety) compared to N12 (industry standard) in the coastal regions. The results show that a fast growing variety such as N41 should be harvested at 12 months compared with the slower growing N12, which reaches peak RV yield at approximately 17-18 months along the coast. Similarly, in inland areas (Figure 2c), a newer, faster growing variety N31 shows peak RV yields at 22 months, while N12 shows peak yields at 24 months. It must be noted that current harvest age recommendations are based largely on growth rates of N12 in the rainfed regions. These results suggest that optimal harvest age will depend on variety, and that the optimal age may need to be reduced for newer, faster growing varieties.

### *Variety x age x eldana interactions*

Where eldana is a problem, optimal harvest age is dependent on the eldana resistance of a variety. Figure 2a shows RV yields of susceptible and resistant variety groups in the coastal region. The results show that at 10, 11 and 12 months at harvest, susceptible varieties generally outperform resistant varieties. However, after 13 months (carry-over), resistant varieties outperform the susceptible group. Eldana normally increases in carry-over cane, and susceptible varieties are thus unable to reach their full potential when aged. This figure highlights the fact that only resistant varieties should be aged along the coast. The above trends are further supported by Figure 2b, showing actual eldana damage (%ID) in the susceptible and resistant groups as harvest age increases along the coast. Basically, damage increases at a higher rate as harvest age increases in the susceptible group compared with the resistant group.



**Figure 1.** Average RV yields at different harvest ages in (a) the coastal and inland regions of the industry, (b) for N12 compared to N41 along the coast, and (c) for N12 compared to N31 in the inland region.



**Figure 2. Average RV yields (a) and % internodes damaged (b) of susceptible and resistant variety groups across harvest ages in the coastal region.**

**Conclusions**

The data mining exercise showed that on average, the optimal harvest age along the coast and inland regions are 15 and 22 months, respectively. Some newer varieties have faster growth rates than N12 and their harvest ages need to be reduced accordingly. It may not be possible to recommend a generic optimal harvest age for each variety, as this varies with region. Specific variety x region harvest age recommendations are therefore necessary. Eldana resistance is essential to ageing cane in the coastal region, and this results in higher RV yields compared to ageing susceptible varieties. Susceptible varieties were shown to be more sensitive to eldana damage as harvest age increases. The data mining approach was valuable in extracting key trends and best management practices relating to variety choice, harvest age and eldana control.