LAND MANAGEMENT AND THE CREATION OF HABITAT FOR *ELDANA SACCHARINA* WALKER. (Lepidoptera: Pyralididae)

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Abstract

Damage to, or clearing of, riverine woodland creates opportunities for the colonisation of banks and beds by reeds, grasses and sedges. South of the Tugela River these sedges contain a high proportion of *Cyperus immensus* (C.B. Cl.), which is a favoured host of *Eldana saccharina* Walker, and it has rarely been found in any other host plant in this region. Riverine woodland should be preserved, not only to prevent erosion, but to exclude the principal host of this cane borer. Where riverine woodland has already been cleared it is suggested that fast-growing trees such as Brazilian pepper *(Schinus terebenthifolius)* be used to colonise river banks. It is likely that disturbance and drainage of papyrus (*Cyperus papyrus* L.) beds results in heavy infestations in this host.

Introduction

Eldana saccharina Walker distribution extends southwards in Natal in the warm coastal climate created by the Mocambique Current, and south of the Tugela River it is restricted to a narrow coastal belt. A favoured indigenous host is *Cyperus immensus* (C.B. Cl.), and it appears to have extended southwards only in this host. During surveys of the distribution of *Eldana saccharina* it has become evident that disturbance or clearing of riverine woodland has created opportunities for colonisation of the banks and beds by sedges, which often include this preferred host of *Eldana saccharina*. Quantitative and photographic evidence for this are given here.

Methods

Ten rivers through the cane belt were surveyed on foot, recording the abundance of *C. immensus* and of riverine woodland every 100 paces on a simple scale of 0 (absent) to 4 (very abundant). The degree of disturbance of the riverine woodland was also recorded, 0 being undisturbed and 4 entirely cleared. Artificially planted trees, such as gum, were regarded as riverine woodland and were recorded as undisturbed provided there was a full canopy. The relationships between these ratings for *C. immensus* abundance, and either riverine woodland abundance, or its reverse, the degree of disturbance, were analysed by simple regression.

TABLE 1

Coefficients of determination (r^2) for the relationships between *C. immensus* abundance along rivers, and riverine woodland abundance or its degree of disturbance.

River No. (North to South)	Region		Riverine woodland abundance	Degree of disturbance
1	Kwambonambi		0,099	0,102
2	Empangeni	Zululand	0,149	0,220
3	Empangeni	North	0,004	0,002
4	Mtunzini	Zululand	0,013	0,036
5	Mtunzini	South	0,058	0,156
6	Amatikulu		0,183	0,381
7*	Stanger	North	0,355	0,271
8*	Tongaat	Coast	0,496	0,597
9*	Amanzimtoti	South	0,441	0,443
10*	Umzinto	Coast	0,429	0,416

*South of the Tugela River

Results and Conclusions

Table 1 gives values of r^2, the coefficient of determination, for these regressions. For each river, r^2 gives a measure of the amount of variation in *C. immensus* abundance which has been explained by the independent variables, either riverine woodland abundance or its reverse the degree of woodland disturbance.

The relationship is negative in the case of riverine woodland abundance, positive in the case of riverine woodland damage. It is evident that for rivers north of the Tugela River (Nos. 1-6) there is very little relationship between *C. immensus* abundance and riverine woodland abundance or disturbance, but that south of the Tugela there is a marked relationship, with up to 50% of the variation being explained by either of the independent variables. In other words, in the southern regions of the cane belt there is a very good chance that river banks or beds will be colonised by *C. immensus* wherever riverine woodland has been damaged or cleared. It would be unrealistic to expect a higher proportion of the variation in *C. immensus* distribution to be explained by either of these two parameters alone, because other factors such as river bank height, rate of water flow, the distribution of rocks and rapids, and competition by other plants affect it as well. Although similar colonisation by *C. immensus* occurs in the north, other plants, notably reeds, tall grasses, other sedge species and even nettles, tend to exclude it from openings created by woodland clearing, so that its distribution is much more sporadic. Nevertheless, the evidence suggests that this sedge is one of the principal plants colonising river banks wherever riverine woodland has been disturbed (Figs. 1 and 2) and this is particularly so in the southern regions, which is a strong argument for preserving riverine woodland along drains, streams and rivers (Fig. 3), quite apart from its stabilisation of the banks against erosion. Although *E. saccharina* is very rare in sugarcane south of the Tugela River, it might invade cane if large reservoirs were created in indigenous hosts growing adjacent to cane. This invasion might be triggered by a change in variety or in cultural practice, or by a short term climatic change.

Where riverine woodland has already been cleared, as it has on many farms throughout the cane belt, it is suggested that trees or shrubs be artifically planted. Fast-growing species such as Brazilian pepper *(Schinus terebenthifolius)* are potentially good candidates for this purpose, and by developing a canopy would displace reeds and sedges on the banks, thereby saving the cost of clearing the latter mechanically or with herbicide. Moreover clearing of reeds and sedges without planting trees would not only expose the banks to serious erosion, but would leave them open to recolonisation. There are examples of farms where the river banks have been artificially planted with trees (Fig. 4).

Papyrus *(Cyperus papyrus L.)* is also a natural host of *E. saccharina,* with its southern limit at about Richards Bay. It is particularly heavily infested when the rhizome is exposed by a drop in the water level (Table 2). Drainage of the Umfolozi Flats has left large areas of papyrus with rhizomes unsubmerged for at least part of the year, while isolated plants thrown up along artificial drains are also ideal for attack. Seasonal or longer-term changes in the water table would create large reservoirs of *E. saccharina* around the edges of papyrus beds. It is not clear to what extent outbreaks of the insect in the Hluhluwe and Umfolozi areas can be attributed to climatic changes, or to disturbance of papyrus beds, but from Richards Bay northwards there has been extensive construction work, drainage, and clearing over the years; both on a large scale and on individual farms. Such disturbance would not only alter the water tables in existing papyrus beds, but it appears that the plant itself has been able to colonise small dams and occurs for example in at least one stream near Empangeni.

TABLE 2

Live or emerged *E. saccharina* in *C. papyrus* plants with submerged or unsubmerged rhizomes

	Submerged		Unsubmerged	
	Rhizome	Flower	Rhizome	Flower
Eldana found . . .	0	4	46	8

Figure 1. Cleared drainage line with *C. immensus* stands (right foreground). Palms (centre background) show there was once riverine woodland present.

Figure 2. Cleared tributary completely filled with *C. immensus* (down centre between cane, right, and regenerating scrub, left).

Figures 3 & 4. The solution: either preserve the riverine woodland (Fig. 3) or plant rapidly growing hedges (Fig. 4). In either case the loss of productive land is relatively small.