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The Effect of Continuous Pollen Trapping on Sealed Brood, Honey Production and Gross Income in Northern Alberta

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ABSTRACT

Continuous pollen trapping from package bee colonies and its effects on brood and honey production was studied for three years (1983-85) in the Peace River region of Alberta, Canada. An average of 9.4 kg of pollen was collected and there was little effect on sealed brood production compared to controls. Honey production was reduced by 20% on an average compared to controls, but was significant only in one of the three years. The gross income from the trap treatment was 21% greater than for the control treatment. Pollen trapping in the Peace River region seems to offer beekeepers a chance to diversify and to increase their gross income.

INTRODUCTION

POLLEN CAN readily be trapped from colonies by means of pollen traps. The use of pollen traps has increased over the last 10 years for both bee feed and human consumption, and has become an important source of income for some beekeepers. The literature concerning the effects of pollen traps on colony development and honey production is contradictory. For example, Goodman (1974) and McLellan (1974) reported little or no effect on brood rearing, while Butler and Simpson (1953), Moeller (1977) and Duff and Furgala (1986a) reported that brood rearing and colony development may be adversely affected.

Hirschfelder (1951) indicated that the pollen collected in traps was done at the expense of honey production. Rashad and Parker (1958) reported that although pollen traps increased the pollen collected by a colony by 80%, it also reduced honey production by 41%. Recently, Duff and Furgala (1986b) showed that honey production was significantly less for continuously trapped treatments. Moeller (1977) and McLellan (1974) indicated that increased winter losses are probably the result of the use of pollen traps on colonies during the previous summer.

Moriya (1966) found that foraging decreased during the first week following installation of a pollen trap, but returned to normal thereafter. Colonies with pollen traps store only a little less pollen than those colonies without traps (McLellan 1974). Since pollen traps may cause an increase in the percentage of pollen collectors (Moriya 1966), it appears that colonies are at first confused but then adjust to the pollen trap and continue to forage with increased emphasis on pollen collection to supply the needs of the brood (Free 1967).

The following study investigated the potential for pollen production in the Peace River region of Alberta, the gross income return and how continuous trapping may affect sealed brood and honey production.

METHODS AND MATERIALS

Twenty 2-lb. (0.9 kg) packages were hived on 16, 10 and 5th of April in 1983, 1984 and 1985, respectively, and randomly divided into two treatment groups. One treatment was managed with pollen traps and one without pollen traps. Ontario Agricultural College (OAC) pollen traps (Alberta Agriculture, 1985) were placed under treatment colonies on 30 May, 10 June and 6 June in 1983, 1984 and 1985, respectively. Once the pollen traps were placed under colonies they remained in place until the honey crop had been removed. Pollen was collected continuously and weighed every 3-5 days. For convenience of presentation the pollen data were summarized in approximately 15 day intervals.

Sealed brood was measured twice each year (before and after trap placement) by placing a piece of clear acrylic plastic with inscribed grid (2.5 x 2.5 cm) over the sealed brood. Honey production was determined by weighing honey supers before and after extraction.

Data were analyzed by the analysis of variance for a completely randomized design. Comparison among the treatment means was done by the Standard Error of the Difference of means (SED; Cochran and Cox 1968).

RESULTS

Sealed Brood. The first sealed brood measurement (before trap installation) showed no significant difference in each year between treatment groups. In 1984, on 28 June, the sealed brood area in the trap treatment (3241 cm^2) was significantly less ($P < 0.05$) than in the no trap (4050 cm^2) treatment (Table 1). In 1983 and 1985 no significant differences were evident in sealed brood area for the measurement after trap installation.

Honey Production. In 1983 total honey production per colony was significantly less ($P < 0.05$) in the trap treatment (79 kg) compared to the no trap treatment (115 kg) (Fig. 1a). In both 1984 and 1985 the trap treatment produced less total honey, but the differences were not significant (Figs. 1b and 1c).

Pollen Production. Mean pollen production per colony was 12.7, 7.2 and 8.4 kg in 1983, 1984 and 1985, respectively (Fig. 1). The pattern of collection varied with each year, however, late June and early July tended to produce maximum amounts.

Gross income. The summary of the gross income for the trap and no trap treatments is shown in Table 2. The three-year average shows that the gross dollar value of the trap treatment (honey and pollen) exceeds that of the no trap treatment (honey only) by 21 percent.

In all three years the gross income of the trap treatment exceeded the no trap treatment with a high of 26% in 1983 and a low of 13% in 1984. Even with a 31% decrease in honey production in 1983, the gross income of the trap treatment was 26% greater than the no trap treatment.

DISCUSSION

Many beekeepers may want to diversify their income by collecting pollen. A previous one-year study in the Peace River region (MacDonald 1983) reported that 3.1 kg of pollen was collected per colony (collecting 50% of time) and the average honey production was 79 kg. However, no control was used for comparison. The present study has clarified those results by demonstrating that pollen can be trapped continuously and by comparing trapped treatments with no trap treatments over three years.

Though honey production is the prime concern for most Canadian producers, some do contract for pollination service or collect pollen to supplement or diversify their income. In the Peace River region paid pollination service is almost non-existent, so pollen collection is the only viable alternative to supplement honey production income.

Although the value of collected pollen may add to a beekeeper's gross income, as demonstrated in this study, the effect of pollen traps on colonies is not consistent. Our study agrees with the results reported by Goodman (1974) and McLellan (1974) in that there was little or no effect of pollen traps on brood rearing, whereas Butler and Simpson (1953), Moeller (1977) and most recently, Duff and Furgala (1986a) indicated that brood rearing and colony development may be adversely affected by trapping pollen from colonies. Increased winter losses have been attributed to trapping pollen from colonies because of reduced brood production by Moeller (1977), but Duff and Furgala (1986a) did not find a significant difference. Most of the colonies in this study were wintered with no apparent problems, but detailed evaluations were not made in the spring. This is certainly an area that should be investigated before continuous trapping into late August could be recommended to beekeepers planning to winter. Waller et al. (1981) reported that pollen trapping caused reduced brood rearing, but feeding pollen patties to these colonies during the trapping period increased brood rearing and thus compensated for the negative effect of the trap.

Our results indicate that brood rearing was significantly reduced in only one year and probably caused little effect on colony development; however, honey production was reduced significantly in one year and by at least 11% in all years. Duff and Furgala (1986b) also showed a significant reduction in honey production in their pollen trapping study. In spite of the reduced honey production the gross income of the trap treatment in our study was greater by at least 13 per cent in all three years.

This study has demonstrated that colonies can produce both honey and pollen in the Peace River region. However, with pollen traps continuously under colonies honey

Table 1. MEAN SEALED BROOD AREA (CM^2) OF COLONIES WITH AND WITHOUT POLLEN TRAPS.

Year	Measurement	Traps	No Traps	SED[1]
1983	19 May	1436	1425	228.6 NS
	14 July	4056	4088	209.1 NS
1984	8 May	1038	996	81.4 NS
	28 June	3241	4050	266.9 *
1985	10 May	1959	1839	126.2 NS
	3 July	3610	3503	224.9 NS

[1]SED = Standard Error of Difference between treatment means
* = $P < 0.05$, NS = Not Significant

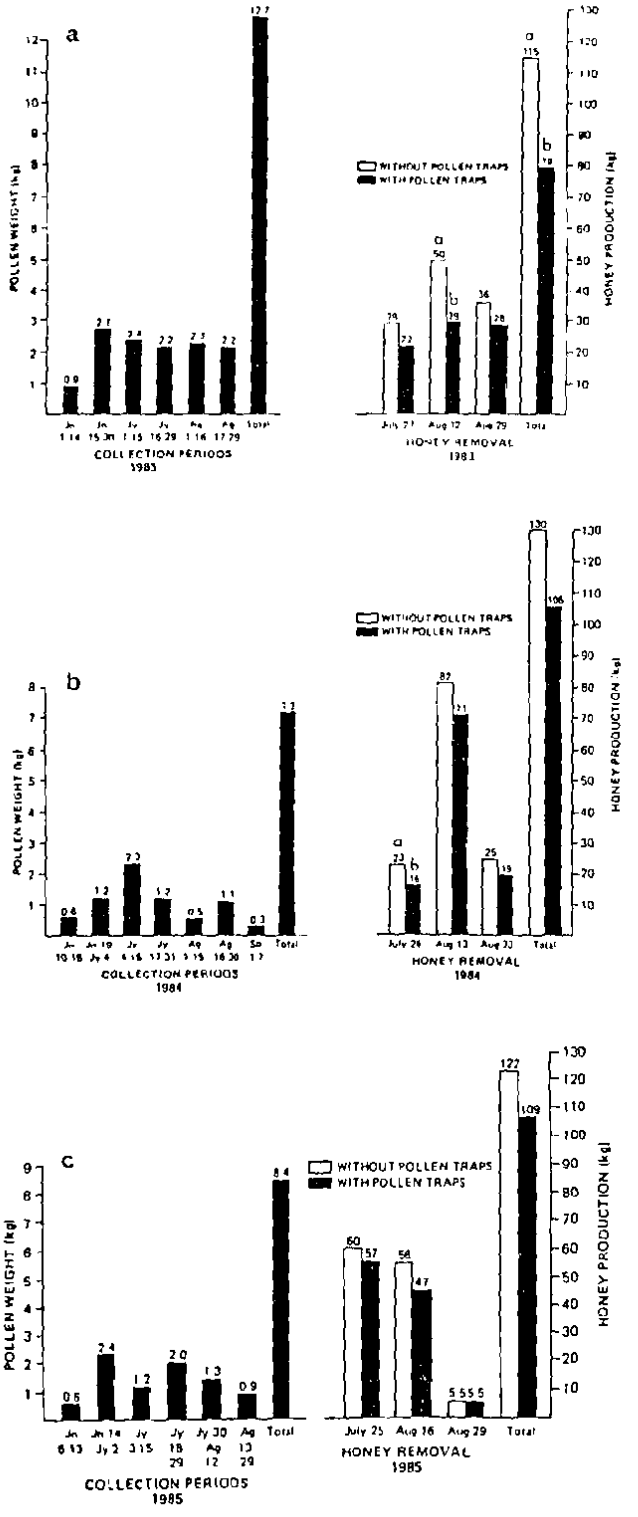

Figure 1. Pollen and honey production in 1983(a), 1984(b) and 1985(c). Numbers above histograms are production values. Treatments for honey production with different letters above the histograms for a measurement date are significantly different ($P < 0.05$); no letter above the histograms for a measurement date indicates no significant difference.

Table 2. COMPARISON OF GROSS INCOME FOR COLONIES WITH AND WITHOUT POLLEN TRAPS

Year	Treatment	Mean honey production (kg)	% Difference	Honey income @ $1.10/kg	Mean pollen production (kg)	Pollen income @ $6.60/kg	Gross	% Difference
1983	No trap colonies	115		$126.50	-	-	$126.50	
	Trap colonies	79	31	$86.90	12.7	$83.82	$170.72	26
1984	No trap colonies	130		$142.45	-	-	$142.45	
	Trap colonies	106	19	$116.60	7.2	$47.52	$164.12	13
1985	No trap colonies	122		$134.20	-	-	$134.20	
	Trap colonies	109	11	$119.90	8.4	$55.44	$175.34	23
3 year avg	No trap colonies	122		$134.42	-	-	$134.42	
	Trap colonies	98	20	$107.80	9.4	$62.04	$169.84	21

All dollar values are Canadian ($1.00 Canadian = $0.73 U.S.)

production is reduced. Considering the gross income from both pollen and honey, beekeepers may increase their income by trapping pollen from some of their colonies depending on price and markets.

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