1999
EVALUATION OF:

GAUCHO SEED DRESSING APPLIED TO CANOLA

ON
THE HONEY BEE, (*Apis mellifera Linnaeus*)

AT
INDIAN HEAD, SASKATCHEWAN
(INDIAN HEAD RESEARCH STATION SITE)

An experiment conducted for
Bayer Canada Inc.

Industry contact: [redacted]

Report prepared by:
[redacted]

AgView International Inc. Pesticide Research Report - for Bayer Canada

CROP: Canola
INSECT: Honey bee, ***Apis mellifera***

NAME AND AGENCY:
[redacted]

TITLE: EVALUATION OF GAUCHO SEED DRESSING APPLIED TO CANOLA ON THE HONEY BEE, (*Apis mellifera*, Linnaeus) AT INDIAN HEAD, SASKATCHEWAN (INDIAN HEAD RESEARCH STATION SITE, RM# 156, SW-19-18-12-W2) IN 1999.

MATERIALS: Canola treated with Gaucho seed dressing.

METHODS: The experiment was conducted on the Agriculture & Agri-Food Research Station at Indian Head, Saskatchewan (RM# 156, SW 19-18-12-W2) to evaluate: the effect of Gaucho seed dressing applied to canola at planting on the honey bee, ***Apis mellifera***.

Pursuit Smart Canola (45A71) was seeded at fourteen pounds per hectare with fifteen pounds per acre of 11-51-00 phosphate fertilizer on May 21, 1999 at a depth of three-quarters of an inch into a loose moist seedbed using an International double disc press drill with 6 inch row spacing.

Treatments consisted of: an untreated check plot and a plot treated with Gaucho applied at 800 g ai/100 kg seed. Individual plots were seven metres by nine metres. Treatment blocks were separated by ten metres. The foliar insecticide, Decis 5 EC was applied to seedlings on both plots on June 13 to control flea beetles. Odyssey herbicide was applied for weed control (July 5) and one hundred pounds of ammonium sulphate fertilizer per hectare was surface applied to all plots.

Larval development within colonies was determined from a series of eggs that were monitored until the larval cells were sealed. Coloured plastic pegs were used to delimit the location of the cells being observed.

Sealed brood was measured using a sheet of plexi-glass that had been subdivided into squares measuring 2.54 centimetres by 2.54 centimetres. Colony populations were maintained as similar as possible by exchanging sealed brood (i.e. pupae) between colonies prior to placing them into the pollination cages.

Cohorts of one hundred worker honey bees were individually marked with paint (Harris 1979) and their survival recorded every seven days. Colony populations were estimated from successive survival of cohorts of worker bees ([redacted] 1985).

Pollination cages measuring six metres wide by nine metres long by two and a half metre high were placed over the canola (see figure 1) and the bees introduced into the cages after the canola had reached the twenty per cent bloom stage. One colony containing nine Langstroth frames, honey, worker bees, a queen and brood was placed on a white sheet of corrugated plastic at the west end of each pollination cages on July 19, 1999. The plastic was monitored frequently for any evidence of dead bees.

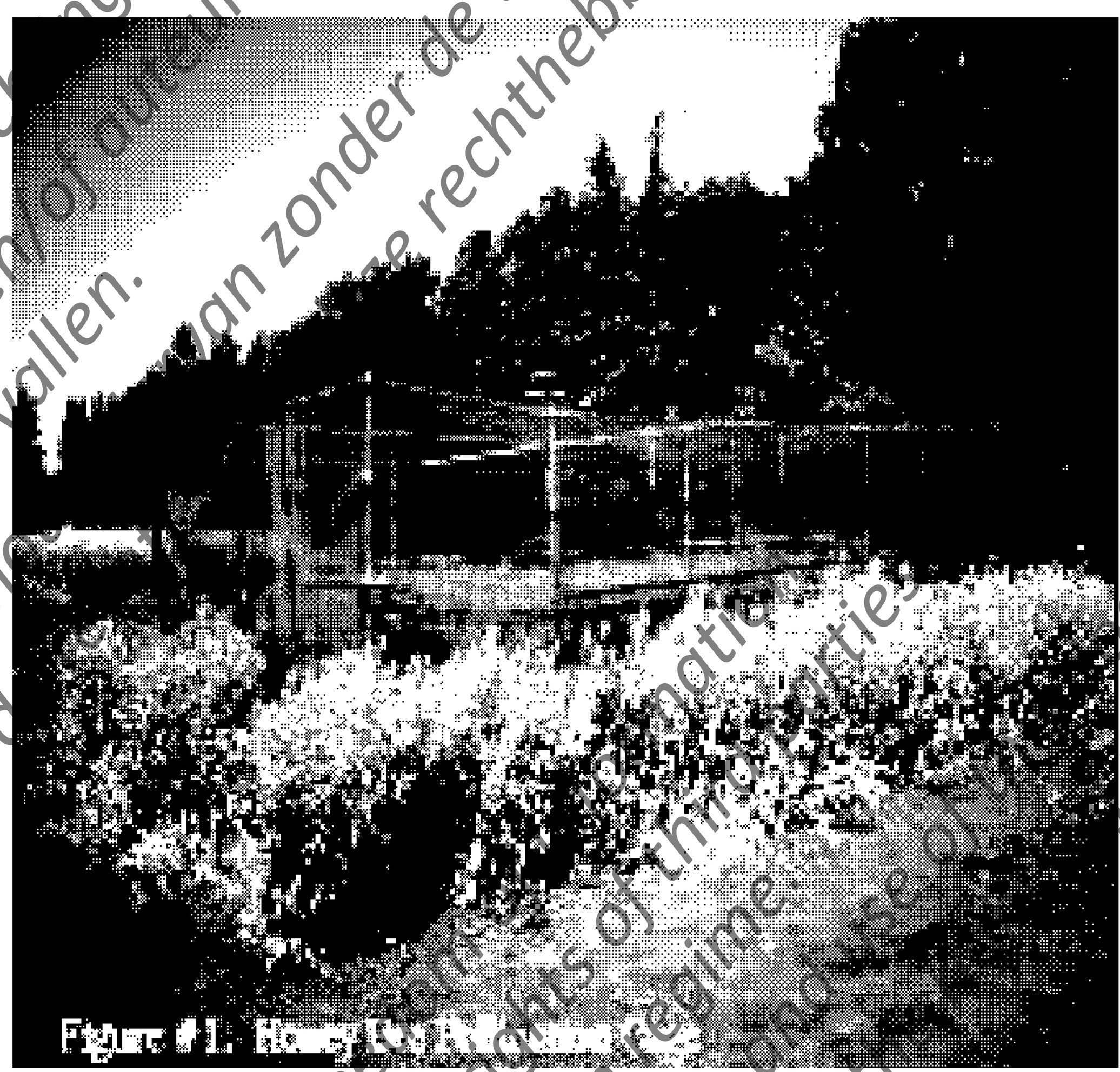


Figure #1.

Worker honey bee foraging activity within pollination cages was assessed by counting the number of bee visiting canola flowers in a one metre square area. Four replicates of canola were assessed every thirty minutes from 10:00 am. until 6:00 pm.

RESULTS and DISCUSSION: Worker honey bees appeared to forage normally within the pollination cages. Worker bee forager density within the cages was very similar.

On July 22 and July 28, average foragers per square metre were slightly higher on the canola grown without an insecticidal seed treatment (see figure 2 & 3). The differences were not large and reflected that the colony foraging on the untreated canola contained about twelve hundred more workers than the colony foraging on the Gaucho treated canola.

Figure 2. Average number of honey bees foraging on canola per square metre in pollination cages on July 22,1999.

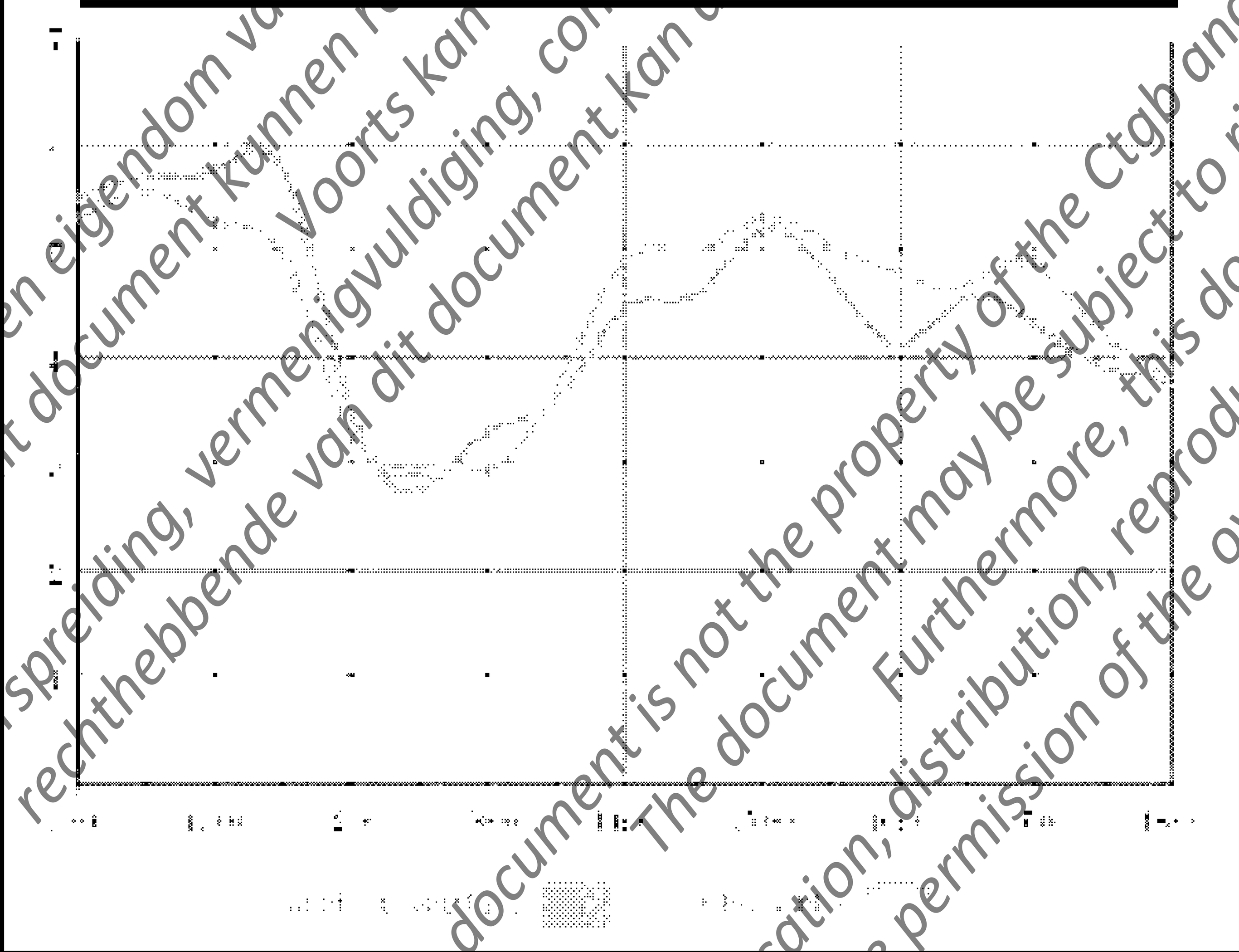
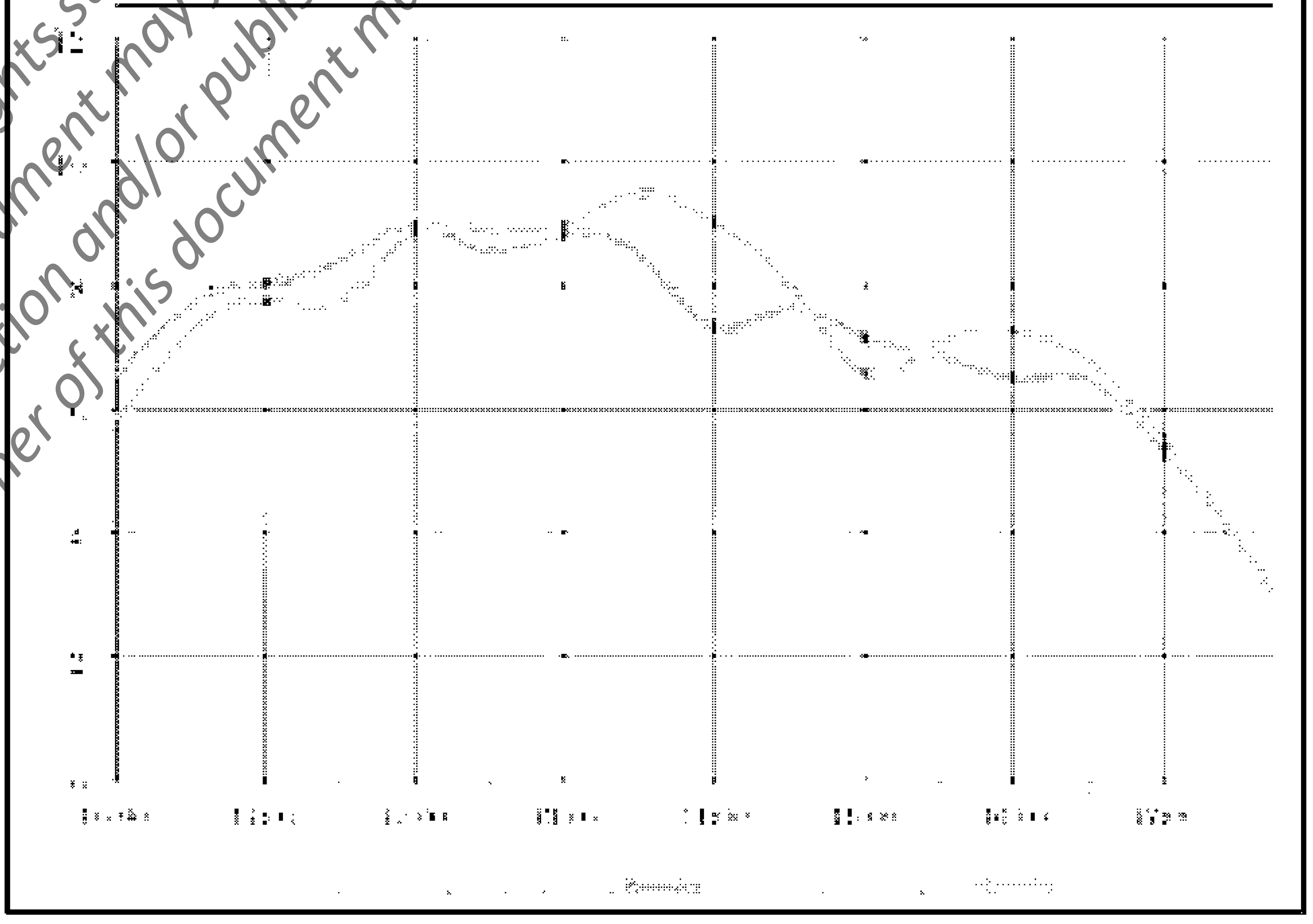


Figure 3. Average number of honey bees foraging on canola per square metre in pollination cages on July 28, 1999.



On August 2, foraging activity declined on the untreated plot relative to the Gaucho treated plot (see figure 4). The reduced foraging activity; mirrored a declined in brood rearing. Reduced brood rearing appeared to be

initiated by workers depositing honey into the area being utilized for brood rearing which stimulated the production of queen cells. A reduction in brood rearing activity is often taken as a signal by the colony that the queen is failing and needs to be replaced. Alternatively, the queen may have been injured during colony manipulation or was becoming unproductive, but this was not apparent.

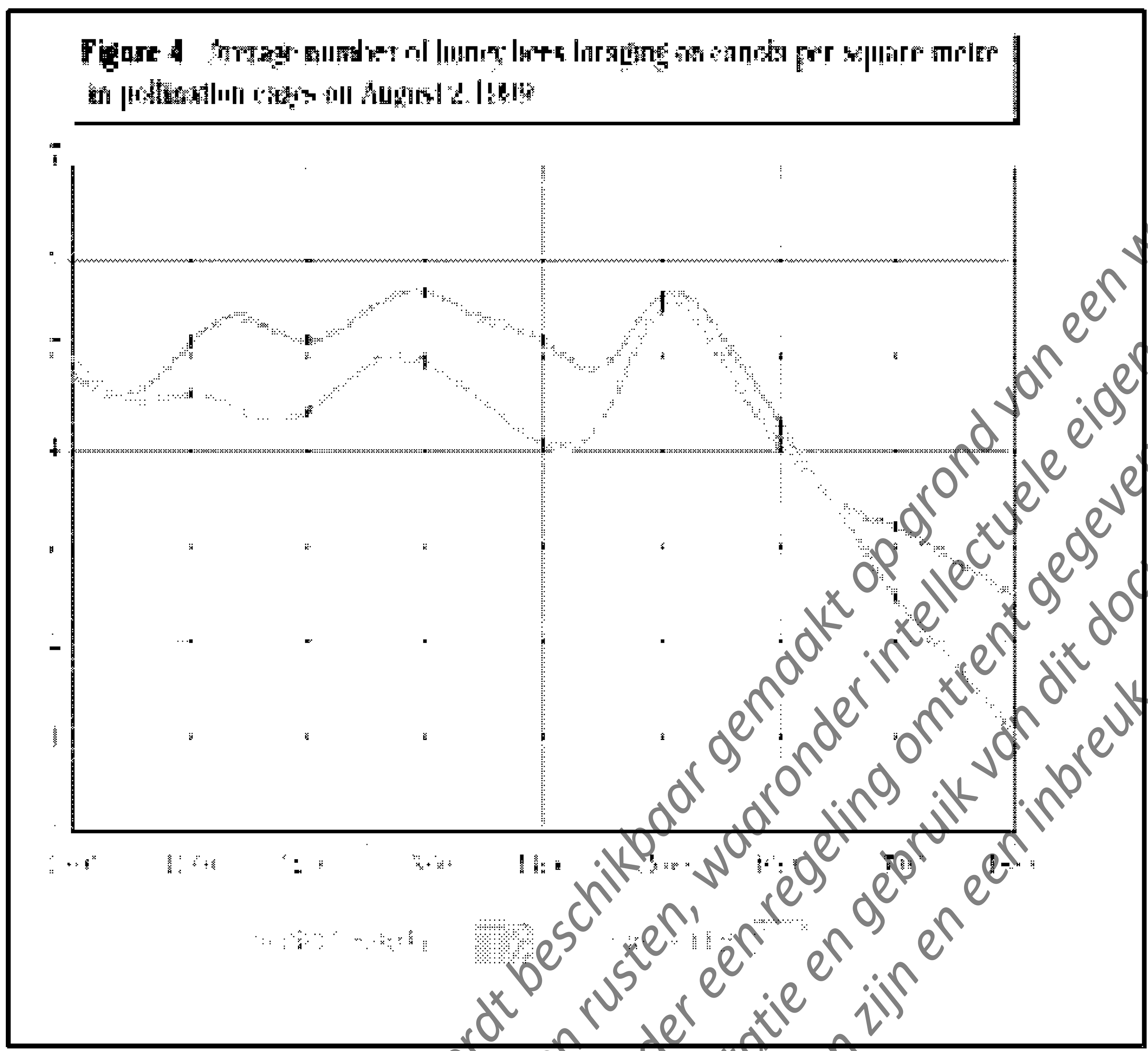


Figure 4 Average number of honey bees foraging on canola per square metre in pollination cages on August 2, 1989

The average worker honey bee lives about twenty-five to thirty-eight days during the summer (Free & Spencer-Booth 1959, Sekiguchi & Sakagami 1966). Very few workers survive for more than seventy-two days after emergence during the summer. An exceptionally long-lived worker bee may live eight-four days during the summer.

Figure 5 illustrates a typical survivorship curve for worker honey bees on the Canadian Prairies, provided you assume that few bees die during the first twelve days of their life. For a cohort of one hundred worker bees, death begins soon after emergence. Eighteen days after they emerged approximately 90.7 ± 6.8 % bees will remain. Thirty days after they emerged 67.9 ± 12.0 % will remain. Forty-two days after they emerged 39.2 ± 8.27 % will remain. Fifty-four days after they emerged 15.2 ± 8.27 % will remain. Sixty-six days after they emerged 3.4 ± 3.6 % will remain. Seventy-eight days after then emerged 0.5 ± 1.2 % will remain. Ninety days after they emerged only 0.02 ± 0.15 will remain. If significant mortality occurs during the first twelve days of life then the above means life expectancy values will over-estimate the true values.

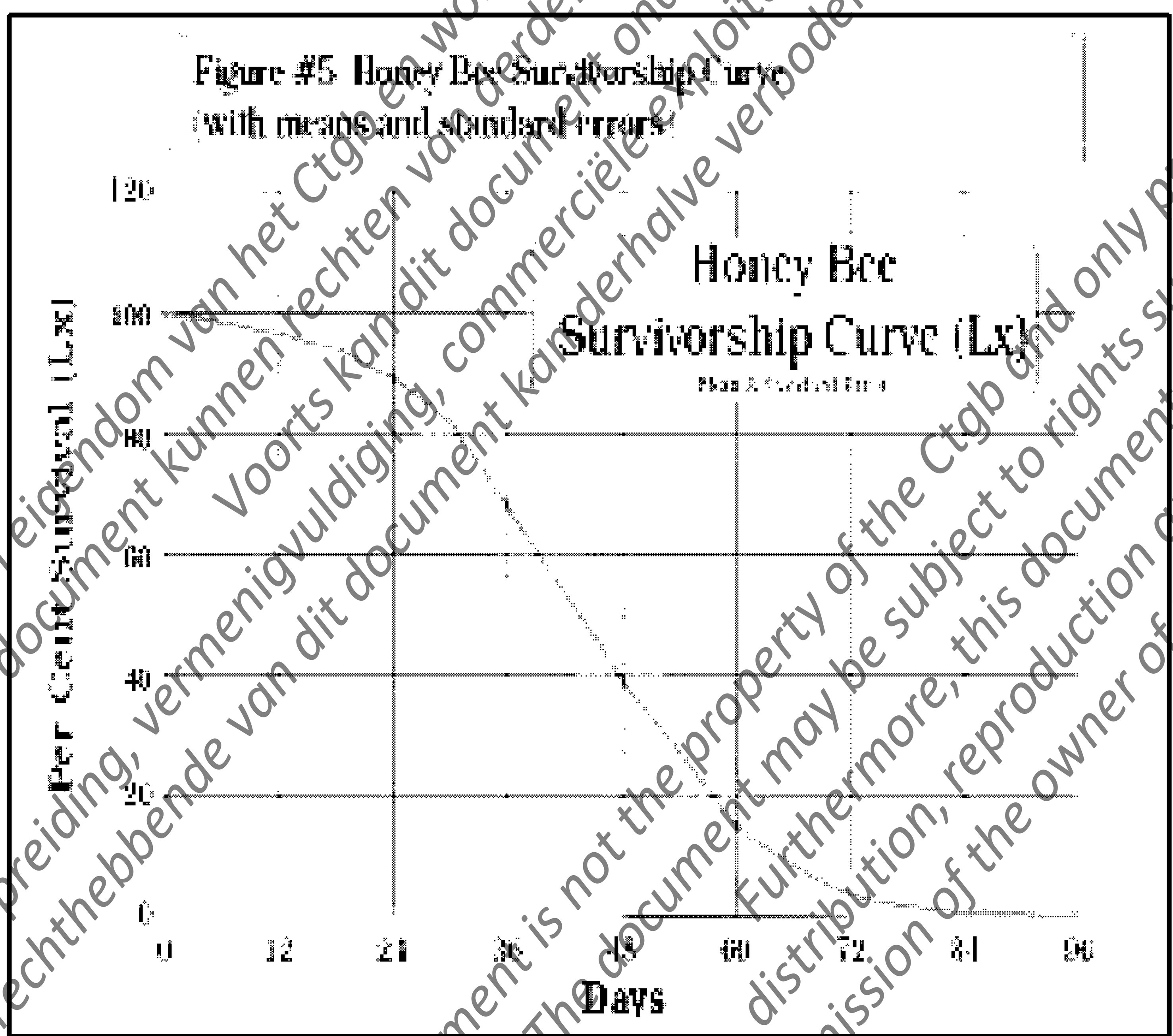


Figure #5 Honey Bee Survivorship Curve (with means and standard errors)

Table 1. Summarizes the survival of worker bees in the two colonies. Worker bee survival was similar in the two colonies and within expected limits, except for the last cohort of bees, which had been marked with green paint. Worker bee survival for the cohort marked with green paint was lower than anticipated from the standard L_x survival curve. The lower than anticipated survival occurred in both the treated and untreated canola plots. The reason for the lower survival was not apparent. It may be that the decline in the amount of brood being reared caused worker bees that would normally care for brood to begin foraging at a younger age. According to [redacted] (1952), the younger bees are when they begin to forage the shorter their life expectancy.

Dead worker bees were not observed in front of the colony at levels that would indicate bee poisoning had occurred.

Table 1. Survival of five cohorts of marked worker honey bees in 1999

Survival of Cohorts of Marked Bees										
	Gaucho treated Plot					Untreated plots				
Date	Pink	White	Yellow	Orange	Green	Pink	white	Yellow	orange	Green
20-Jun										
27-Jun	76					79				
04-Jul	74	53				75	81			
11-Jul	66	52	56			69	75	87		
18-Jul	52	46	46	86		38	68	85	88	
25-Jul	15	40	43	80	85	12	34	76	82	87
2-Aug	5	10	20	55	53	2	13	32	56	56

Brood survival for 100 eggs isolated within the colonies on July 22, July 28, and August 2 were 96, 97, and 93 respectively in the colony foraging on the canola grown from untreated seed and 95, 98, and 94 respectively in colonies foraging on canola grown from Gaucho treated seed. Larval survival was less than anticipated but higher than the 91.5 % reported by Fukuda & Sakagami (1968). The lower larval survival observed on eggs isolated on August 2, 1999 may have been related to a decline in the availability of honey and pollen as flowering declined within the plots.

Brood reared by both colonies declined while they were confined to the pollination cages. In the colony foraging on canola grown from untreated seed, there were 2,445 and 1,090 square centimetres of brood on July 21 and August 2, respectively. In the colony foraging on canola grown from seed treated with Gaucho, there were 2,335 and 1,271 square centimetres of brood on July 21 and August 2, respectively.
On July 21 colony populations were estimated to be 14,670 worker bees in the colony foraging on the canola grown from Gaucho treated seed and 15,957 worker bees in the colony foraging on the canola from untreated seed. On August 2, colony populations were estimated to be 19,739 worker bees in the colony foraging on the canola grown from Gaucho treated seed and 21,328 worker bees in the colony foraging on the canola from untreated seed.

Conclusions:

Gaucho treated canola did not show any obvious or measured adverse affects on colony development. Brood rearing was with limits considered to be normal, worker bee survival was within expected limits, worker bee populations increased while the colonies were confined to the pollination cages, dead bees were not observed in front of the colonies, and foraging activity was similar in both colonies.

References:

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