Discussion

C. Y. HSIN: Will the overhead sprinkler system be cost- effective in the dry season when water is precious?
G. FUNASAKI: Watercress is produced in areas where the supply of spring and artesian well water is plentiful. The naturally available water is recycled through the sprinkler system. Therefore, it would be cost-effective even during the dry season.

C. Y. HSIN: Are there any area limitation on the overhead sprinkler system?
G. FUNASAKI: There are no limitations as to locations that I know of. The system does appear to be more effective in large scale operations rather than in smaller ones, however.

P. A. C. OOI: Is there any reason for the difference in aggressiveness between the Taiwan and Trinidad strain of *Cotesia plutellae*?
G. FUNASAKI: Mass-rearing of the Taiwan strain in the insectary was easier because the female *C. plutellae* parasitized more DBM larvae than the Trinidad strain. The Taiwan strain appears to be healthier and more active than the Trainidad strain. It could be that the Trinidad strain had too much inbreeding before we got them from the CIBC insectary, whereas the material from Taiwan was field collected.

D. G. HARCOURT (COMMENT): Regarding the disruption of female activity, it is possible that the cooling effect of sprinkler irrigation is more important than the physical interference.

G. S. LIM: Has the threshold developed by you adapted by the farmers? If not why?
C. N. CHEN: No. Because the sampling method and the counting of insects in the field are still too complicated for the farmers, and the farmers are reluctant to take any risk when they see worms on their vegetables.

H. CHI: According to your results, the spatial distribution of DBM larvae can be described by a negative binomial distribution. It would be interesting to know how many plants with one or more larvae per 100 plants, when the mean is one larva per plant.
C. N. CHEN: About 35 to 50 plants would habor at least one larva each.

H. CHI: You have used Taylor's power law to describe the relation between means and variances. Could you conclude there is a common k or not?
C. N. CHEN: No. We could not detect any common k. In fact, k is unstable over the density range.

O. MOCHIDA: How often do you find DBM population on farmers' field below threshold level?
C. N. CHEN: I would say about 50% chemical applications by farmers are unjustified in their fields according to our control thresholds.

A. SAGENMUELLER: Would you please explain sample size in your paper concerning relationship between population density and sample size.
C. N. CHEN: The sample size (n) is obtained according to the following relationship:

$$n = \left(\frac{t}{D}\right)^2 am^{b-2}$$

where t is the student's t value at $p = 0.05$; D is the precision level chosen (i.e. $D = 0.1$ or 0.2, in this case); m = mean density in terms of number of larvae per plant; and a and b are parameters obtained from fitting to Taylor's power law, $S^2 = am^b$. Therefore, we can see that sample size is determined by several variables. When population density is high, we need less sample size to secure the same level of precision. In other words, sample size needed is inversely proportional to the population density.

A. VATTANATANGUM: How often vegetable growers in Taiwan follow the control threshold as recommended in your presentation?
C. N. CHEN: The control threshold discussed in our paper is recommended to the extension workers as a guidance for deciding the necessity of control in a farmer's field. It is still rather difficult to recommend it to the vegetable growers.

L. C. CHANG: Because the duration of crucifers for seed production is longer than for fresh market production, DBM is usually more damaging to the former. Would you care to comment on the DBM control stragey for crucifer seed production.
C. N. CHEN: I have no experience on crucifers for seed production. But I would think that chemicals with long residual effect will do a good job.

A. SIVAPRAGASAM: What is your sample size to estimate mean and variance of DBM population in the field? I presume you used the Taylor's Power Law to estimate sample size. Recently it has been found that Taylor's estimation could be spurious at low insect densities. On the other hand Iwao and Kuno's model for patchiness regression was a good fit. Why not use the latter model? Any comment?
C. N. CHEN: The sample size was 230-240 plants. As far as optimal sample size is concerned, I think either model is good enough for practical purposes. I have no any preference.

A. SIVAPRAGASAM: Do you think an economic threshold of one larva/plant is a practical threshold considering the fact that DBM population is aggregated in most cases. How about using sequential sampling to estimate critical densitites?
E. D. MAGALLONA: There are practical problems with regards the use of one larva/plant as the economic threshold. In fact, I think it is quite low under practical field situation and if followed may mean more insecticide applications than practical. The work really needs refinement to consider such problems as aggregation, population of natural control agents, stage of the plant infested, among others. The use of sequential sampling may be tried as a part of this refinement effort.