THE EFFECT OF PLUCKING ON THE OCCURRENCE OF TEA INSECT PESTS

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Summary
In Japan, tea plucking is done with plucking machine popularly and the new growth is removed at a time. Therefore, plucking has a big influence on the occurrence of foliage insect pests. The larvae of *Adoxophyes honmai* that prefer tender leaves were removed by plucking and later plucking influenced more to the population. *Homona magnanima* that prefers old leaves increased when the harvest time delayed. *Caloptilia theivora* that grows on the new leaves in juvenile stage was influenced strongly by plucking. About 70% of the larvae were removed by plucking, then the occurrence of the next generation decreased. *Empoasca onukii* inserts eggs in the tender stems mainly between the 2nd and the 3rd leaf, then, plucking was effective. Plucking is useful as one of the pest management methods in tea fields.

Key words: Plucking, A.honmai, H.magnanima, C.theivola, E.onukii

In Japan, the tea new shoots are plucked mainly with plucking machine for two persons three or four times in a year. Usually three or four new leaves and a bud are removed at a time. Therefore, the plucking method has a big influence on the occurrence of foliage insect pests. For reducing agricultural chemicals at tea field plucking and pruning operations are useful methods as a cultural control of insect pests.

1 Effect of plucking on occurrence of Smaller tea tortrix and Oriental tea tortrix

These experiments were conducted in 1973-1974 at Shizuoka Tea Experiment Station (Shizuoka, Japan). At result of survey on the first generation in June 13th, 1973, density of smaller tea tortrix, *A. honmai,* is lower at the block plucked May 20th (87% moth catches with light trap) than the earlier plucked block in May 10th (34%) and May 15th (72%). At plucked blocks in May 10th and 15th, older larvae, the 5th instar, are more than at the later plucked block May 20th (Fig.1). On the other hand, larvae of the oriental tea tortrix, *H. magnanima*, are most at the delayed plucking block to the other earlier plucked blocks, and at block plucked in May 20th older larvae are conspicuous compared with other two blocks. The results (in 1974) in Fig 3 also indicate that delayed plucking in July 6th is effective on reduction of smaller tea tortrix, but it is unclear compared to the first generation in 1973 for the high density. At the normal plucking block, new shoots were plucked in June 30th and at the double plucking block, plucked twice in June 30th and July 6th. Oriental tea tortrix showed high density at the delayed plucking block like the first generation in 1973. These insect pests, *A. honmai* and *H. magnanima*, occur four to five times in a year and deposit eggs on mature or old leaf, then, few eggs are removed by plucking. Hatched young larvae of *A. honmai* prefer young leaves and come up to new shoots. When grown, larvae make nest with webbing mature or young leaves. Therefore, delayed plucking, when larvae still in the nests, is effective to take them off. But earlier plucking is not effective because larvae not yet hatch usually. On the other hand, *H. magnanima* prefers old leaves to make their nest that are difficult to take off by plucking. The moths prefer thicket for laying eggs than smooth surface of the hedge just after plucking. The moths fly to the fields or parts not yet plucking, so the density of this insect is higher at delayed plucking or non plucking field.

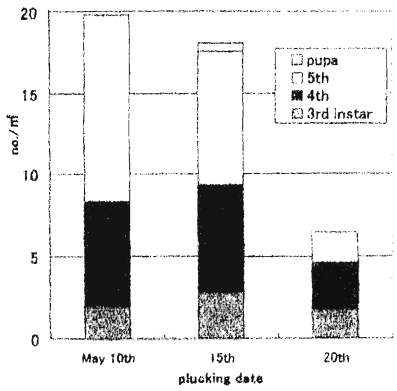

Fig.1 Effect of plucking on the density and structure of larval instars of Adoxophyes honmai

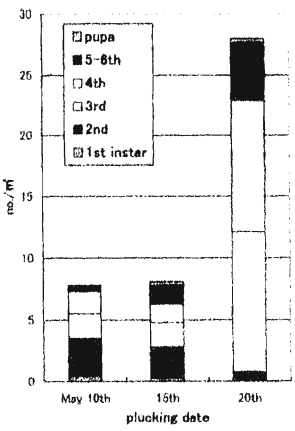

Fig.2 Effect of plucking on the density and structure of larval instars of Homona magnanima

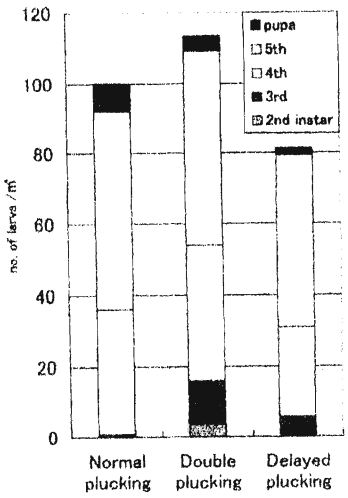

Fig.3 Effect of various plucking on the occurrence of Adoxophyes honmai

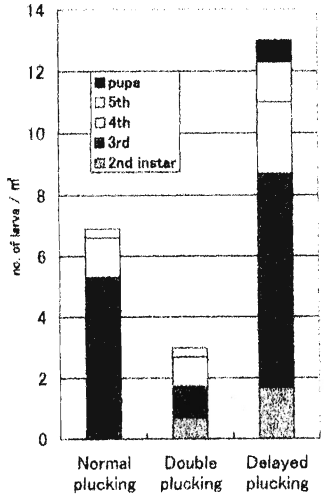

Fig.4 Effect of various plucking on the occurrence of Homona magnanima

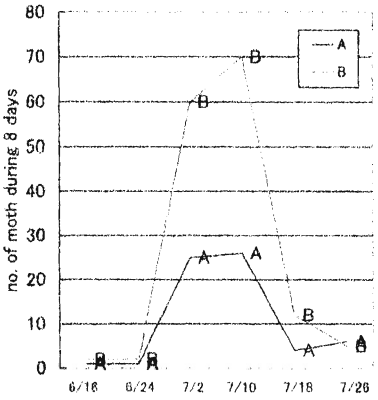

Fig.5 Occurrence of Caloptilia theivora moth at the field plucked on different date
A: plucking date June 20th (rate of banjhi shoot 39%)
B: plucking date June 27th (r.b.s. 93%)

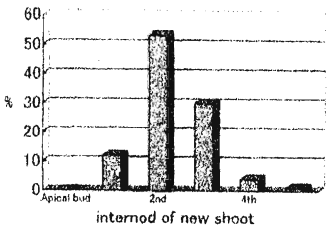

Fig.6 Laid egg place of Empoasca onukii on tea new shoot

2 Effect of plucking on occurrence of Tea leafroller and Tea green leafhopper

Tea leafroller, *Caloptilia theivore*, lays eggs only on young fresh leaves and larva starts life as a leaf miner and subsequently rolls up several young leaves during the life cycle. After that, larvae move down to old leaves for pupating, so the plucking has influence on the larvae but does not affect the density of pupa. About 70% of the larvae on new leaves are taken off by early plucking (A: rate of banjhi shoot 39%) and adults decrease, but at late plucking block (B: r.b.s. 93%) larvae already moved down to the old leaves unable to pluck, then, many adults occur following behind(Fig.5). Tea green leafhopper, *Empoasca onukii*, inserts eggs in the tender tissue of the stem, mainly the 2nd internod between the 2nd and 3rd leaf from top (Fig.6), therefore plucking has large influence on the occurrence of this insect.

3 Conclusion

Cultural operations like plucking and pruning are useful methods for control of insect pests at tea field. But the occurrences of tea insects have complex relations with tea plant growth. The control of sprout period of the following crop by plucking was effective to escape from the damage of leafroller or leafhopper temporarily, but it often causes increase of the next stage population because the insects synchronize with the growing of the new shoots. We must more study on the ecology of insects and tea plant.