

# イネドロオイムシの摂食刺激物質としてのアデニンおよびその 関連物質

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著者	松田, 一寛
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the present experiment, we can also adopt the same speculation, however, in the case of compound C, a somewhat different explanation may be needed. For a more exact explanation of the mechanism of the mating suppression in the field or greenhouses, more detailed investigations on the functions of individual components and related substances in the mating of this insect are required.

Adenine and Related Substances as Feeding Stimulants for the Rice Leaf Beetle, *Oulema oryzae* KUWAYAMA (Coleoptera : Chrysomelidae)<sup>1</sup>

Kazuhiro MATSUDA

Faculty of Agriculture, Tohoku University,  
Amamiyamachi-Tsutsumidori, Sendai 980, Japan

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The rice leaf beetle, *Oulema oryzae* KUWAYAMA, is one of the most important pests feeding predominantly on the rice plant. The role of plant substances in the behavior of this insect has not been studied previously. In the course of studies on host selection of the beetle, it was suggested that the bleeding sap of rice plants acts as a feeding stimulant, while the sap has been known to contain adenine in considerable amounts (YOSHIDA et al., 1970). These findings prompted this investigation of the effects of adenine and related substances on feeding of the rice leaf beetle.

The beetles used in the experiments were collected at the pupal stage in the field, and kept under laboratory conditions until adult emergence. The effects of the various substances as feeding stimulants were examined by the bioassay method on filter paper, as described previously (MATSUDA and MATSUMOTO, 1974). All assays were conducted in complete darkness at 24–25 °C for 24 hr, using 20 newly emerged beetles per dish, starved for 24 hr prior to the tests. Five replicate tests were run at each of three concentration levels: 0.1, 0.01 and 0.001 M. However, the substances with low solubility in water could not

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be examined at 0.1 M. concentration. The degrees of feeding stimulation were judged by the differences in condition of the test filter papers nibbled by insects from that of the control papers and expressed by a graded number of the symbol "S". The symbol "N" was used to indicate no stimulative effect and the symbol "In" to indicate feeding inhibition of the beetles by the test substance.

Effects of adenine and related substances on the feeding of the rice leaf beetle are summarized in Table 1. Adenine and adenosine showed efficient stimulative effects at the higher concentrations of 0.01 M and 0.1 M, but not at 0.001 M. Among the nucleotides of adenine, adenosine-3'-monophosphate and adenosine-5'-monophosphate served as effective feeding stimulants at 0.1 M, 0.01 M and even at 0.001 M. On the other hand, adenosine-5'-diphosphate, disodium salt and adenosine-5'-triphosphate, disodium salt did not show any stimulative effect at 0.001 M and 0.01 M, and rather acted as deterrents at 0.1 M. Other purines (guanine, hypoxanthine and xanthine) and their nucleosides (guanosine, inosine and xanthosine) were not active at lower concentrations and became deterrents at the highest concentration tested. Among the pyrimidines and their nucleosides tested, cytosine was slightly active at 0.01 M and 0.1 M, but its nucleoside, cytidine was not effective at any concentration tested. Other pyrimidines and their nucleosides including thymine, thymidine, uracil and uridine did not show stimulative effects, and the latter two inhibited the feeding of the beetles at 0.1 M.

It is well known that adenine and related substances occur in many plants. Nevertheless, the effect of adenine and related substances as

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Table 1. EFFECTS OF ADENINE AND RELATED SUBSTANCES ON THE FEEDING OF THE RICE LEAF BEETLE<sup>a</sup>

Compounds	Concentration tested		
	0.1 M	0.01 M	0.001 M
Adenine	SS	SS	N
Adenosine	SS	SS	N
Adenosine-3'-monophosphate	SS	SS	S
Adenosine-5'-monophosphate	SS	SS	S
Adenosine-5'diphosphate, disodium salt	In	N	N
Adenosine-5'-triphosphate, disodium salt	In	N	N
Guanine	*b	N	N
Guanosine	In	N	N
Hypoxanthine	In	N	N
Inosine	In	N	N
Xanthine	*	N	N
Xanthosine	In	N	N
Cytosine	S	S	N
Cytidine	N	N	N
Thymine	N	N	N
Thymidine	N	N	N
Uracil	In	N	N
Uridine	In	N	N

<sup>a</sup> See the text for explanation of symbols "S", "N" and "In".

<sup>b</sup> Not tested.

feeding stimulants for phytophagous insects has been studied in only a few cases. HSIAO (1961) reported that adenine and related substances serve as potent feeding stimulants for the larvae of the alfalfa weevil, *Hypera postica* (GYLL.). BELAND et al. (1973) observed that adenosine stimulated feeding in the sweet clover weevil, *Sitona cylindricollis* FAHRÆUS. HSIAO (1961) suggested that adenine and related substances may elicit feeding response in certain restricted groups of insects, unlike the general feeding stimulants for a wide range of species, such as sucrose. The findings reported in this paper also support the view that adenine and/or related substances, which are characteristic constituents of rice plant sap (YOSHIDA et al., 1970), are selectively perceived as feeding stimulants by the rice leaf beetle. The other major characteristic secondary substances of the rice plant, benzoic acid, salicylic acid and tricine were not stimulative to the feeding of this insect (MATSUDA, unpublished). The brown planthopper, *Nilaparvata lugens* (STÅL), which also feeds exclusively on the rice plant was shown not to react to any of adenine, cytosine, thymine and uracil in feeding (SOGAWA, 1972).

These facts indicate that insects with the same host ranges are not always stimulated by identical substances in their host plant selection.

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