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NOTE

Potential Herbicidals and Growth Regulators Constituents in Rice Hulls of *Oryza sativa*

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Isolation and identifications of the compounds were done from the hulls of *Oryza sativa*. The main component of hulls momilactone A (**1**) and momilactone B (**2**) were reported as good herbicidals. Furthermore the isolation and identifications of two compounds were done from the hulls of *Oryza sativa* which gave the two compounds guanine (**3**) and nicotinamide (**4**) as reported an effective plant growth promoting factor. However, it has been suggested that rice hulls compounds, possess herbicidals as well as growth promoting substances. Such information might indicate the rice hulls contained two types of potential substances which constituents are useful as herbicidals and growth promoters.

Key Words: *Oryza sativa*, Poaceae, Rice hull compounds, Herbicidals, Momilactone A, Momilactone B, Growth regulators, Guanine, Nicotinamide.

Rice (*Oryza sativa* L.) is the principal cereal food in Asia and the major staple of the majority of the population. It generally occurs as two types, with white and coloured hulls, although the white hulled variety is more common (85 %). The germination of rice seed is of great agricultural importance and it has long been known to be influenced by compounds present in the seed coat (hull)[1].

As part of searches concerning the growth herbicidal substances in higher plants, identified momilactones A (**1**) and B (**2**) from the seed hulls of *Oryza sativa*, which inhibit the growth of roots of rice at less than 100 ppm[2]. Potential herbicidals further reported that momilactones A and B, especially the latter, inhibit the germination of lettuce seeds and growth of roots of rice[3]. In order to establish the functional groups in the momilactones necessary for activity, several derivatives were prepared and assayed for inhibitory activity. It was found that all derivatives which inhibited lettuce seed germination had activity against the growth of rice roots[3].

Momilactones A and B were also isolated from UV-irradiated, dark-grown rice coleoptiles[4]. The same compounds were also produced in blast-infected, WL 28325-treated rice leaves. They appear to be the first clearly

identified cereal phytoalexins. Furthermore, rice seedlings[5] inhibited the growth of cress (*Lepidium sativum*) and lettuce (*Lactuca sativa*) seedlings when the cress and lettuce were grown with rice seedlings. The putative compound causing the inhibitory effect of rice seedlings was isolated from their culture solution and identified as momilactone B[5].

Momilactone B was found recently in the root exudates of rice and three day-old rice seedlings were transferred to hydroponic culture and the level of momilactone B released into the environment from the seedlings was measured[6]. The concentration at which momilactone B is released and its effectiveness as a growth inhibitor suggest that it may play an important role in rice allelopathy

The inhibitory activity directed against duckweed and the results of the germination assays in culture tubes (GACT) on three weed species, *C. differmis, L. chinensis* and *A. retroflexus*, was discussed[7]. Momilactone A and B had high inhibitory activity against duckweed. Momilactone B was more active than momilactone A. Further herbicidal activity of momilactones and some new minor components were reported[8-12].

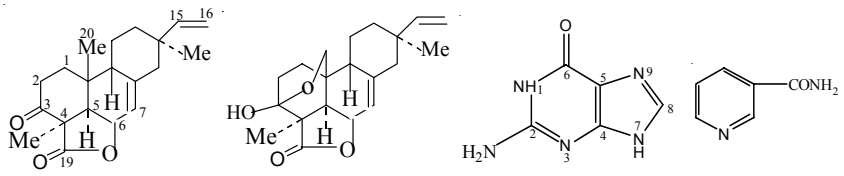
In the course of search for plant growth regulating substances in higher plants, methanol extract of rice hulls was reported to contain at least two effective growth promoting factors guanine (**3**) and nicotinamide (**4**)[13,14]. Since the growth promotive effect of nicotinamide on the intact rice plants and results of the biological activity test was previously reported[13,14]. Nicotinamide exhibited flower-inducing activity in *L. paucicostata* 151 grown on one-tenth-strength M medium containing benzyladenine[15].

When the seedlings of dwarf rice and wheat were treated with guanine solution of several concentrations, the growth promotion in the plant length was observed at the concentration as low as 0.001 ppm[14]. The growth promotive effect of guanine on the intact plants at such low concentration was reported[13]. Growth regulating activities on wheat seedling tested in the same manner, the results are summarized[14].

The results of biological activities on dwarf rice seedlings with guanine (authentic) added to Kasugai nutrient solution cultivated for 10 d was reported[14]. A concentration of 0.01 ppm was most effective and the elongation of plant height was 19 % promotion. And as showed in[14], the length of third leaf sheath was also elongated by 27 % compared with control plants under the same condition. Each table represents the average of the six plants length measurements. As reported in literature[14], the cultivation in the pure solution of sample in distilled water was less effective than the above cases. It is interesting phenomenon, the growth of root was markedly inhibited at a concentration of 10 ppm in distlled water in the same manner as mentioned above, although growth of aerial part was not inhibted (The above data are taken from the literature[14]).

Growth regulating activities on wheat seedlings was tested in the same manner as on dwarf rice seedlings. The results were reported[14]. In the case of wheat seedlings cultivation was continued for 6 d on pure sample solution in distilled water. The elongation of plant height was about 10 % promotion, which was observed at the concentrations of between 1 and 0.0001 ppm. Inhibitory action on wheat seedlings was observed on both of aerial and subterranean parts at a concentration of 10 ppm (The above data are taken from the literature[14]).

As the literature of rice hull compounds, we found that momilactones were reported by several authors as herbicidals and the favourable growth effects guanine and nicotinamide also reported.



(**1**) (**2**) (**3**) (**4**)

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