

(学位第3号様式)

学 位 論 文 要 旨	
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題 目	Study on the mechanism of paddy field weed control by straw in rice and wheat or barley double cropping system. (米麦二毛作体系における麦わらの水田雑草抑制機構に関する研究)
<p>In the rice crop field of northern Kyushu, incineration of straw exerts "smoke damage" which interferes with the lives of the local residents, and also loses valuable organic matter used for maintaining the soil fertility. Although the rate is decreasing in recent years, straw incineration is still being practiced because many farmers believe that "the occurrence of paddy weeds can be suppressed by straw incineration". However, this may not be the true and scientific analysis of the straw handling is required from on-site leaders. Therefore, in this study, we aimed to clarify the influence of the difference between the straw plowed-in treatment and the incinerated straw treatment on the weed development and to obtain the basic knowledge for establishing proper straw treatment technology for the future in Northern Kyushu. Analysis was focused on the allelopathy shown by the straw, ① comparative confirmation of the degree of suppression of the occurrence of weeds by incineration and plowing of the straw, ② search and identification of the allelochemical in the straw showing weed control, and ③ the verification of the suppression action of the specified substance.</p> <p>First, local field trials were conducted on the difference between the treatment of plowed in straw and the treatment of the incinerated straw on the occurrence of the weeds and the influence on the growth of rice plants. As a result, the effect of controlling weeds was better than that of incineration. Regarding the growth of paddy rice, although tillering was suppressed by plow-in, the rise in ripening rate increased and the trend toward increased sales was observed. This result suggested the merit of the plowed-in straw treatment, and the reproducibility was confirmed in the pot test. The straw of either barley or wheat had a strong inhibitory effect against various paddy field weeds. In addition, although the effect of suppressing weed development due to straw rushing decreased with time, the residual effect could be confirmed from the autumn of the rice harvest season to the heading phase of the next spring. In this case, sufficient weed control effect was recognized when the amount of the straw applied was the same level as that at the actual cultivation site, 20 to 40 kg / a. From this result, it was considered that the treatment method of the straw is better than the incineration method.</p> <p>Next, in order to demonstrate the existence of growth inhibiting substances leaching from the straw, a germination test was performed using mustard spinach (<i>Brassica rapa</i> var. <i>perviridis</i>) as the test plant. The effect of barley straw and incinerated ash of the straw, which are considered to have strong allelopathic activity, on germination was investigated. As a result, straw immersion water showed a marked germination suppression effect compared with straw incineration ash immersion water. This time, , the conditions where soil was added to immersion water were examined to investigate the involvement of</p>	

soil and soil microorganisms, but the same tendency was observed regardless of the presence or absence of soil addition. These findings suggested that the polysemic substance quickly leaches from the straw after the paddy field flooding. Therefore, attempts were made to identify phenolic substances contained in the immersion water of barley straw and its incineration ash by LC / TOF-MS. The involvement of five kinds of substances was confirmed. Among them, (\pm)-2-phenylpropionic acid was strongly suggested to be involved. In addition, as a result of verification using mustard spinach, germination was markedly inhibited at a low concentration of 2 ppm.

This study made it possible to explain many parts of the weed control mechanism by processing wheat or barley straw and to give a new perspective on straw treatment in the double cropping system.