International Symposium “Root Research and Applications”
RootRAP, 2–4 September 2009, Boku – Vienna, Austria

Wet Injury in Drained Paddy Fields and Root Aerenchyma Formation of Wheat

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ABSTRACT

Excess soil moisture injury often occurs in Japanese wheat production area. Japanese farmers produce wheat in drained rice paddy fields because rice is overproduced in Japan. In such growth conditions, wheat plants often show wet injury. However, the detail of wet injury of wheat fields is not clear.
We observed wheat growth and soil conditions in paddy fields in 2007 and 2008 in Japan. Eighty observation points were set in a drained paddy field. Close relation was found between soil water content and plant height.
We observed root aerenchyma formation in wheat plants in the fields. The relationship between degree of wet injury of wheat plant and root aerenchyma formation was not clear.
KEYWORDS: Excess-moisture injury, Triticum spp., Upland field converted from paddy field, Wet endurance.

1. SOIL WATER CONTENT AND PLANT HEIGHT

We measured soil water content by TDR and plant height of wheat (cv. Norin 61) in a drained fields in 2007. Eighty observation points were set in the drained paddy field. A significant negative relation was found between soil water content and plant height (Figure 1: Oyanagi 2008). On the other hand, we examined soil water content and plant height of wheat in the other 26 fields in 2007 and 2008. Negative correlations were found in 6 fields out of 7 fields in 2007. The negative correlations were found in 15 fields, however, a positive correlation was only found in one field out of 19 fields in 2008 (data not shown). The relationship between soil nutrient contents and plant height in these fields were not clear. These results suggested that excess soil moisture stress limited wheat growth in many drained paddy fields in Japan.

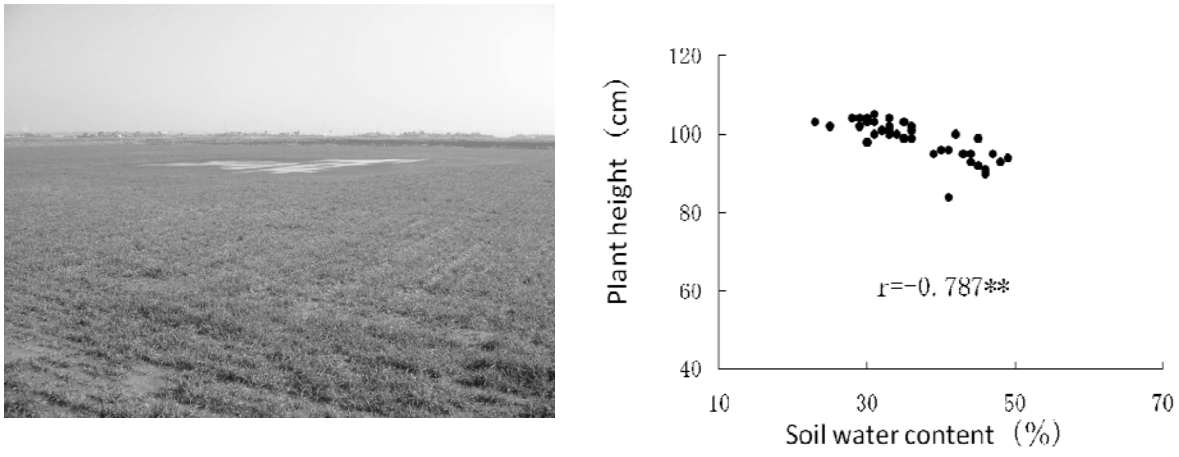

Figure 1. Wheat grown field (left) and data of the 80 points in the field (right).

2. ROOT AERENCHYMA IN THE FIELD

We observed root aerenchyma formation in wheat plants (cv. Norin 61) in a drained paddy field. They were grown in the four points in the field where soil water conditions were different.
Even in the wheat grown in the wet point, significant aerenchyma formation was not observed in the roots (No.1 in the Figure 2: Kawaguchi *et al.* 2008).
Then the relationship between degree of wet injury and root aerenchyma formation was not clear in this wheat cultivar. A new wheat line having significant root aerenchyma and showing waterlogging tolerant should be produced in the future.

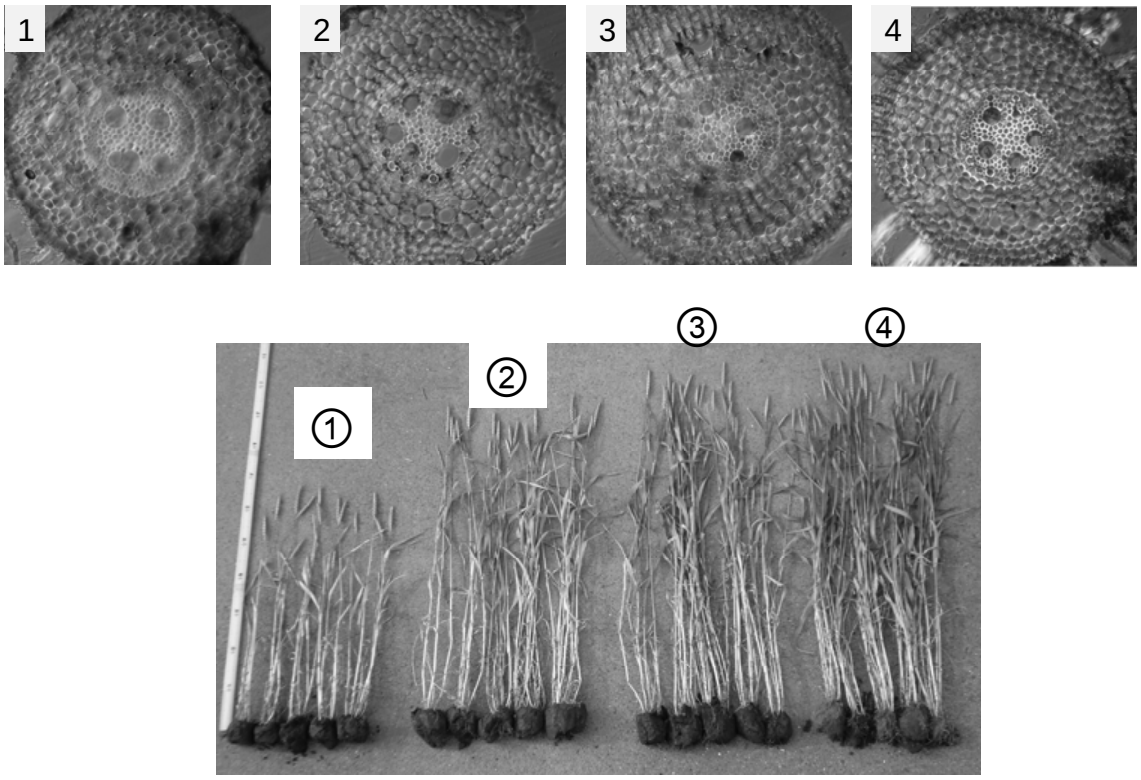

Figure 2. Cross sections of nodal roots (Up) and wheat plants (Down) in a drained paddy field. Degree of waterlogging damage: 1- severe, 2- middle severe, 3- middle mild, 4-mild

REFERENCES

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This work was supported by a grant from the Program for Promotion of Basic and Applied Researches for Innovations in Bio-oriented Industry (BRAIN).