Effects of blue light and paclobutrazol on seed germination, vegetative growth and yield of black rice (oryza sativa l. â€˜cempo irengâ€™)

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Abstrak

Black rice (Oryza sativa L. â€œCempo Irengâ€) is one of local rice varieties in Sleman Regency, Yogyakarta. The black color is caused by high anthocyanin content which is important source of antioxidant. The cultivation of black rice is still limited due to its tall phenotype, long vegetative stage and low productivitycompared to white rice. Paclobutrazol is a growth retardant causing dwarfing in several crop plants and reducing lodging. Blue light can improve plant quality. This research was aimed to evaluate the effect of blue light and paclobutrazol on seed germination, vegetative growth and yield of black rice. The results showed that the average of seed germination as well as the activity of Î±-amylase of seeds subjected to blue light were lower compared to those subjected to sunlight; however, paclobutrazol concentrations did not affect seed germination percentage. The height of rice plants treated with paclobutrazol decreased in accordance with the increase of paclobutrazol concentration.Â Chlorophyll content and tiller numbers increased by paclobutrazol treatment of 12.5 ppm. Nitrate reductase activity was higher in rice seedlings subjected to blue light compared to those subjected to sunlight. Iron (Fe) content of rice plants treated with 25 or 50 ppm paclobutrazol increased compared to control. It was concluded thatpaclobutrazol applicationof 12.5 ppmalready reduced plant height. The higher concentration of paclobutrazol applied the greater reduction on plant height was observed.Blue light treatment applied during black rice seed germination slightly reduced germination percentage and Î±-amylase activity in the germinated seeds. However, blue light treatment combined with paclobutrazol application during black rice seed germination increased chlorophyll content, tiller numbers and Fe content in black rice grain.