Analysis Expression of Phytase Gene In Transgenic Maize (*Zea mays* L.) WITH 27-kDa γ -ZEIN and CaMV 35S promoter

ABSTRACT

Maize (*Zea mays* L.) is an important main food commodity that has a strategic role in agricultural development in Indonesia. Maize has a function as food, feed, fuel and industrial raw materials (*fiber*). The broiler animal feed industry use maize as a raw material component of 35–55%, soybean 10–18%, and fish meal by 5%. In addition to these raw materials in the manufacture of animal feed, phytase enzyme are also added. This enzyme functions to increase growth and increase the uptake of P, Ca, Mg and Zn. The addition of phytase enzymes to feed is useful for breaking the Phytate-P bonds and increasing nutrient uptake in livestock, but causes the price of animal feed production to be high. The use of feed raw materials containing phytase enzyme is expected to reduce the production costs of animal feed. Efforts that can be made are improving the quality of feed raw materials by increasing the enzyme content of phytase by genetic improvement. This genetic improvement is carried out by assembling transgenic plants, with the aim of increasing phytase gene expression. The component that plays a role in regulating gene expression is a promoter. Promoters in transgenic plants play an important role as a regulator of the expression of the inserted gene. The 27-kDa γ-Zein promoter is a specific promoter that expresses genes in Caryopsis. The CaMV 35S promoter is a constitutive promoter that controls gene expression in all tissues and generally does not depend on the growth phase. The research was conducted at the Department of Biotechnology, PT. BISI International, Tbk. , Pare, Kediri, East Java. Transgenic plants were obtained through transformation using *Agrobacterium tumefacien* infection method on B104 maize plants. Phytase gene expression analysis was carried out on leaves, roots and caryopsis at 10, 20 and 30 days after pollination (DAP) using the reverse transcriptase polymerase chain reaction (RT-PCR) method. The phytase enzyme activity test was also carried out by using the colorimetric analysis method phosphomolybdate to see the activity of the μg^{-1} unit phytase enzyme. The results of this study indicated that the insertion of the phytase gene in transgenic plants with the 27-kDa γ-Zein promoter was highly expressed in maize caryopsis, but the number Z6.10 was also expressed in the leaves, while the CaMV 35S promoter the phytase gene was not expressed in all parts of the plant, only expressed on the leaves. Phytase enzyme activity in transgenic plants was 75% higher than in non-transgenic plants. The phytase gene in transgenic maize plants on both the 27-kDa γ-Zein promoter and the CaMV 35S promoter can be inherited in the next generation, but not the same as the prediction of Mendel segregation ratio.

Keywords: Gene expression, Maize, Phytase, Promoter