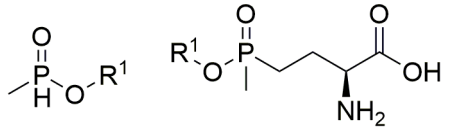
Claims

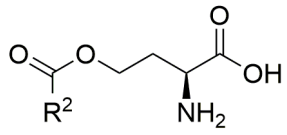
1. An enzymatically catalyzed method for producing L-glufosinate or a phosphoester thereof, comprising a step (a) in which an activated L-homoserine **H_A** is reacted with a substrate **S** of the following structure **(I)** to produce a compound of the following structure **(III)**,



(I) , **(III)** ,

wherein R^1 is selected from hydrogen, alkyl, alkenyl, alkinyl, hydroxyalkyl, aryl,

and wherein the activated L-homoserine **H_A** has the following structure **(II)**:



(II) ,

wherein R^2 is a hydrocarbon group with 1 to 15 carbon atoms which optionally comprises at least one functional group selected from OH, COOH, NH,

and wherein the reaction in step (a) is catalyzed by a sulfhydrylase **E_1**, the polypeptide sequence of the sulfhydrylase E1 is selected from the group consisting of SEQ ID NO: 2 and variants of SEQ ID NO: 2, SEQ ID NO: 6 and variants of SEQ ID NO: 6, SEQ ID NO: 10 and variants of SEQ ID NO: 10, SEQ ID NO: 14 and variants of SEQ ID NO: 14, and the variants are defined as polypeptide sequences with at least 90 % sequence identity to the respective polypeptide sequence.

2. The method according to claim 1, wherein the activated L-homoserine **H_A** is selected from *O*-succinyl-L-homoserine, *O*-acetyl-L-homoserine.

3. The method according to claim 2, wherein the activated L-homoserine **H_A** is *O*-acetyl-L-homoserine.

4. The method according to one of claims 1 to 3, wherein R^1 is selected from hydrogen, alkyl.

5. The method according to claim 4, wherein the alkyl group is selected from methyl, ethyl, *n*-butyl.

6. The method according to one of claims 1 to 3, wherein R^1 is selected from alkyl, alkenyl, alkinyl, hydroxyalkyl, aryl, further comprising a step (b) wherein the compound of the structure **(III)** which is obtained in step (a) is saponified to give L-glufosinate.

7. The method according to one of claims 1 to 6, wherein the sulfhydrylase $\mathbf{E_1}$ is an *O*-acetyl homoserine sulfhydrylase or an *O*-succinyl homoserine sulfhydrylase.

8. The method according to one of claims 1 to 7, wherein the activated L-homoserine $\mathbf{H_A}$ is prepared by fermentation of a strain producing activated L-homoserine $\mathbf{H_A}$.

9. The method according to claim 8, wherein the strain producing activated L-homoserine $\mathbf{H_A}$ is selected from the group consisting of *Escherichia sp.*, *Erwinia sp.*, *Serratia sp.*, *Providencia sp.*, *Corynebacterium sp.*, *Pseudomonas sp.*, *Leptospira sp.*, *Salmonella sp.*, *Brevibacterium sp.*, *Hypomononas sp.*, *Chromobacterium sp.* and *Norcardia sp.*, fungi.