

Table S1. Enzymes and genes involved in the biosynthesis of pipecolic acid\*

Enzyme	Reaction	Organism	Gene
Homocitrate synthase	$\alpha$ -Ketoglutarate + Acetyl-CoA $\rightarrow$ Homocitrate	Fungi	<i>lys1</i>
Homoaconitase	Homocitrate $\rightarrow$ Homoisocitrate	Fungi	<i>lys3/lysF</i>
Homoisocitrate Dehydrogenase	Homoisocitrate $\rightarrow$ $\alpha$ -Ketoadipate	Fungi	<i>lys4</i>
$\alpha$ -Ketoadipate aminotransferase	$\alpha$ -Ketoadipate $\rightarrow$ $\alpha$ -Aminoadipic acid	Fungi	<i>lys6</i>
$\alpha$ -Aminoadipate reductase	$\alpha$ -Aminoadipic acid $\rightarrow$ $\alpha$ -Aminoadipate semialdehyde	Fungi	<i>lys2</i>
PPTse	$\alpha$ -Aminoadipic acid $\rightarrow$ $\alpha$ -Aminoadipate semialdehyde	Fungi	<i>lys5</i>
Pipecolate oxidoreductase	$\alpha$ -Aminoadipate semialdehyde $\rightarrow$ Pipecolic acid	Fungi	---
Saccharopine Dehydrogenase	Saccharopine $\rightarrow$ Lysine Lysine $\rightarrow$ Saccharopine	Fungi	<i>lys8</i>
Saccharopine Reductase	Saccharopine $\rightarrow$ $\alpha$ -Aminoadipate semialdehyde $\alpha$ -Aminoadipate semialdehyde $\rightarrow$ Saccharopine	Fungi	<i>lys7</i>
Saccharopine Oxidase	Saccharopine $\rightarrow$ $\alpha$ -Aminoadipate semialdehyde	Fungi	<i>fap2</i>
Lysine w aminotransferase	Lysine $\rightarrow$ $\alpha$ -Aminoadipate semialdehyde	Fungi	w-at
Lysine cyclodeaminase	Lysine $\rightarrow$ Pipecolic acid	Bacteria	<i>rapL</i> <i>fkbl</i>
Response defense aminotransferase	lysine $\rightarrow$ 2,3-dehydropipecolic	Plants	<i>ald1</i>
Systemic acquired resistance reductase	2,3-dehydropipecolic $\rightarrow$ Pipecolic acid	Plants	<i>sard4</i>

- Notice that some enzymes have been studied but the genes have not been cloned.
- The names of the genes corresponds to filamentous fungi and are not the same than in yeasts

Table S2. Enzymes and Genes involved in the biosynthesis of 4-Oxopipecolic acid and 3-Hydroxypicolinic acid

Enzymes	Reaction	Organisms	Gene
Lysine cyclodeaminase	Lysine $\rightarrow$ Pipecolic acid	Bacteria	<i>pipA</i>
Pipecolate 4 monooxygenase	Pipecolic $\rightarrow$ 4-Oxopipecolic	Bacteria	<i>snbF</i> , <i>visD</i>
Lysine-2-aminoatransferase	Lysine $\rightarrow$ 2-keto, 6 aminocaproic acid (P2C)	Bacteria	<i>hpaA</i> , <i>visA</i>
2 Keto, 6 aminocaproic acid cyclase*	2-keto, 6 aminocaproic acid $\rightarrow$ 3-Hydroxypicolinic acid	Bacteria	-----

\*The enzyme converting 2-keto, 6 aminocaproic acid  $\rightarrow$  3-Hydroxypicolinic acid has not been fully characterized