

# Contents

<b>1</b>	<b>Introduction</b> . . . . .	1
1.1	Introduction . . . . .	1
	References . . . . .	3
<b>2</b>	<b>Production of Plant Bioactive Triterpenoid and Steroidal Saponins</b> . . . . .	5
2.1	Introduction . . . . .	5
2.2	Biosynthesis of Triterpenoid and Steroidal Saponins . . . . .	6
2.3	Candidate Genes Associated with the Biosynthesis Process of Steroidal Saponins . . . . .	9
	References . . . . .	11
<b>3</b>	<b>Metabolic and Functional Diversity of Saponins</b> . . . . .	15
3.1	Classification of Saponins . . . . .	16
3.1.1	Quillaja Triterpene Saponins . . . . .	17
3.1.2	Ginseng Triterpene Saponins . . . . .	19
3.1.3	Soybean Triterpene Saponins . . . . .	22
3.1.4	<i>Allium</i> Steroidal Saponins . . . . .	26
	References . . . . .	28
<b>4</b>	<b>Saponins Versus Plant Fungal Pathogens</b> . . . . .	37
4.1	Introduction . . . . .	37
4.2	Steroidal Saponins Isolated from <i>Allium</i> Crops and Their Antifungal Properties . . . . .	38
4.3	Antifungal Properties of the Isolated Saponin Compounds from Different Plant Species . . . . .	41
	References . . . . .	44
<b>5</b>	<b>Saponin-Detoxifying Enzymes</b> . . . . .	47
5.1	The Role of Saponin-Detoxifying Enzymes in Plant-Pathogen Interaction . . . . .	47
5.2	Detoxification of Tomato and Potato Saponins . . . . .	48
5.3	Detoxification of Oat Saponins . . . . .	50
5.4	Detoxification of Glucosinolates and Cyanogenic Glycosides . . . . .	51

5.5	Detoxification of <i>Allium</i> Saponins . . . . .	53
5.6	Conclusion . . . . .	54
	References . . . . .	55
<b>6</b>	<b>Isolation and Characterization of Triterpenoid and Steroidal Saponins . . . . .</b>	<b>59</b>
6.1	Chemistry of Saponins . . . . .	59
6.2	Triterpene Saponins . . . . .	61
6.2.1	Triterpene Saponins in Leguminous Plants . . . . .	61
6.2.2	Triterpenoid Saponins from the Genus <i>Camellia</i> . . . . .	64
6.3	Steroidal Saponins . . . . .	66
6.3.1	Steroidal Saponins from Monocotyledonous Plants . . . . .	71
6.4	Conclusion . . . . .	73
	References . . . . .	74
<b>7</b>	<b>Method of Estimation in Biological Sample . . . . .</b>	<b>79</b>
7.1	Introduction . . . . .	80
7.2	Determination of Saponins Using TLC . . . . .	81
7.3	Quantification of Saponins by HPLC . . . . .	82
7.3.1	Determination of Saponins in <i>Yucca (Yucca schidigera)</i> Extract . . . . .	86
7.3.2	Determination of Saponin in <i>Camellia sinensis</i> and Genus <i>Ilex</i> Using HPLC . . . . .	87
7.3.3	Determination of Saponin in <i>Ophiopogon Japonicas</i> Using HPLC . . . . .	88
7.3.4	Total Saponins in <i>Ilex paraguariensis</i> Extract . . . . .	89
7.3.5	Isolation and Characterization of Agenosoide Saponin from <i>Allium nigrum</i> . . . . .	89
7.4	Conclusion . . . . .	90
	References . . . . .	90
<b>8</b>	<b>Genetic Engineering of Saponin Target Genes to Improve Yields . . . . .</b>	<b>93</b>
8.1	Biosynthesis of Plant Triterpene and Steroidal Saponins . . . . .	93
8.2	Metabolic Engineering of Saponins . . . . .	97
8.3	Conclusion . . . . .	99
	References . . . . .	99