Supplementary Materials: Enhancement of Palmarumycin C12 and C13 Production by the Endophytic Fungus *Berkleasmium* sp. Dzf12 in an Aqueous-Organic Solvent System

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Table S1. Effects of seven organic solvents on mycelia growth in liquid culture of *Berkleasmium* sp. Dzf12.

Treatment	Mycelia biomass (g dw/L)						
	***n*-Dodecane**	***n*-Hexadecane**	**1-Hexadecene**	**Liquid Paraffin**	**Dibutyl Phthalate**	**Butyl Oleate**	**Oleic Acid**
CK	6.6 ± 0.6a	6.6 ± 0.4c	6.2 ± 0.4f	6.7 ± 0.6d	6.5 ± 0.6a	6.6 ± 0.5a	6.7 ± 0.3a
5% added on day 0	6.4 ± 0.4a	8.5 ± 0.6a	8.8 ± 0.3ab	8.8 ± 0.5ab	7.3 ± 0.4a	6.8 ± 0.3a	7.3 ± 0.4a
10% added on day 0	6.3 ± 0.3a	8.7 ± 0.4a	8.5 ± 0.6abcd	9.7 ± 0.5a	7.7 ± 0.2a	7.0 ± 0.3a	7.0 ± 0.7a
15% added on day 0	7.0 ± 0.2a	8.4 ± 0.2ab	7.5 ± 0.5cde	9.6 ± 0.4a	7.1 ± 0.2a	7.1 ± 0.4a	7.1 ± 0.4a
5% added on day 3	6.8 ± 0.8a	7.1 ± 0.4bc	9.2 ± 0.3ab	9.0 ± 0.2ab	7.7 ± 0.4a	6.7 ± 0.4a	7.0 ± 0.5a
10% added on day 3	6.3 ± 0.3a	7.6 ± 0.3abc	9.1 ± 0.3ab	9.2 ± 0.4ab	7.1 ± 0.7a	6.8 ± 0.7a	7.1 ± 0.5a
15% added on day 3	6.2 ± 0.5a	7.9 ± 0.4abc	8.1 ± 0.5bcde	8.3 ± 0.6abc	7.1 ± 0.5a	7.2 ± 0.4a	6.5 ± 0.5a
5% added on day 6	7.5 ± 0.4a	6.8 ± 0.4c	9.6 ± 0.2a	9.7 ± 0.5a	7.5 ± 0.1a	7.5 ± 0.3a	6.7 ± 0.5a
10% added on day 6	7.0 ± 0.6a	7.1 ± 0.2bc	9.0 ± 0.3ab	8.3 ± 0.2abc	7.1 ± 0.2a	7.0 ± 0.4a	6.4 ± 0.4a
15% added on day 6	6.8 ± 0.4a	6.6 ± 0.6c	9.0 ± 0.2ab	7.9 ± 0.3bcd	7.7 ± 0.3a	6.8 ± 0.2a	6.1 ± 0.3a
5% added on day 9	7.1 ± 0.4a	7.6 ± 0.1abc	8.9 ± 0.2ab	8.8 ± 0.4ab	7.0 ± 0.3a	6.9 ± 0.5a	6.4 ± 0.2a
10% added on day 9	6.7 ± 0.6a	7.3 ± 0.7abc	8.6 ± 0.6abc	8.8 ± 0.4ab	6.840.4a	6.8 ± 0.3a	6.2 ± 0.35a
15% added on day 9	7.0 ± 0.6a	7.1 ± 0.2bc	8.5 ± 0.4abcd	8.1 ± 0.5bcd	6.9 ± 0.3a	6.8 ± 0.2a	6.2 ± 0.2a
5% added on day 12	6.9 ± 0.9a	6.7 ± 0.2c	7.3 ± 0.4def	8.0 ± 0.3bcd	6.7 ± 0.5a	6.7 ± 0.3a	6.4 ± 0.6a
10% added on day 12	6.8 ± 0.3a	6.6 ± 0.3c	7.1 ± 0.6ef	6.8 ± 0.2d	6.6 ± 0.4a	6.7 ± 0.3a	6.8 ± 0.6a
15% added on day 12	6.0 ± 0.5a	6.6 ± 0.5c	7.0 ± 0.3ef	7.1 ± 0.5cd	6.6 ± 0.6a	6.8 ± 0.4a	6.6 ± 0.3a

Note: The organic solvents were applied at 5%, 10% and 15% on days 0, 3, 6, 9 and 12 of culture, respectively. The period of culture lasted for 15 days. "CK" means the control without any organic solvents. The values are expressed as means ± standard deviations (n = 3). Different letters indicate significant differences among the treatments in each column at $p \leq 0.05$.

Table S2. Effects of dibutyl phthalate on palmarumycin production in liquid culture of *Berkleasmium* sp. Dzf12.

Treatment	C12 Yield in Mycelia (mg/L)	C12 Yield in Aqueous Phase (mg/L)	C12 Yield in Organic Phase (mg/L)	C13 Yield in Mycelia (mg/L)	C13 Yield in Aqueous Phase (mg/L)	C13 Yield in Organic Phase (mg/L)	C12 Yield (mg/L)	C13 Yield (mg/L)	C12 Plus C13 Yield (mg/L)
CK	5.0 ± 0.6cd	nd	-	9.2 ± 1.0a	20.4 ± 1.9a	-	5.0	29.6	34.6
5% added on day 0	2.1 ± 0.5d	nd	148.5 ± 15.3a	0.0 ± 0.0e	nd	nd	150.6	0.0	150.6
10% added on day 0	5.6 ± 0.7cd	nd	100.8 ± 8.3bcde	0.0 ± 0.0e	nd	nd	106.4	0.0	106.4
15% added on day 0	2.5 ± 1.0d	nd	58.0 ± 16.2fg	0.0 ± 0.0e	nd	nd	60.5	0.0	60.5
5% added on day 3	5.2 ± 1.9cd	nd	129.7 ± 8.8ab	0.8 ± 0.1cde	nd	nd	134.9	0.8	135.6
10% added on day 3	6.1 ± 0.8cd	nd	107.2 ± 14.0bcd	0.7 ± 0.1cde	nd	nd	113.2	0.7	113.9
15% added on day 3	7.0 ± 1.3bcd	nd	87.1 ± 7.6cdef	0.7 ± 0.1cde	nd	nd	94.1	0.7	94.7
5% added on day 6	6.1 ± 0.9cd	nd	114.0 ± 6.5bc	0.5 ± 0.1de	nd	nd	120.1	0.5	120.5
10% added on day 6	11.3 ± 3.2ab	nd	77.2 ± 9.6def	0.8 ± 0.1cde	nd	nd	88.5	0.8	89.4
15% added on day 6	14.7 ± 2.0a	nd	58.6 ± 12.9fg	1.8 ± 0.2b	nd	nd	73.3	1.8	75.1
5% added on day 9	4.0 ± 0.7cd	nd	94.5 ± 10.8cde	0.0 ± 0.0e	nd	nd	98.4	0.0	98.5
10% added on day 9	8.7 ± 2.7bc	nd	68.8 ± 15.1efg	1.5 ± 0.1bc	nd	nd	77.5	1.5	79.0
15% added on day 9	4.5 ± 1.5cd	nd	40.3 ± 12.6g	0.2 ± 0.1e	nd	nd	44.7	0.2	44.9
5% added on day 12	3.6 ± 0.4cd	nd	52.7 ± 6.6fg	2.1 ± 0.3b	nd	nd	56.3	2.1	58.4
10% added on day 12	8.0 ± 1.4bc	nd	34.8 ± 8.3g	1.4 ± 0.2cde	nd	nd	42.8	1.4	44.2
15% added on day 12	3.8 ± 1.5cd	nd	34.1 ± 4.0g	0.2 ± 0.2e	nd	nd	37.9	0.2	38.0

Note: Dibutyl phthalate was applied at 5%, 10% and 15% on days 0, 3, 6, 9 and 12 of culture, respectively. The period of culture lasted for 15 days. “C12” means palmarumycin C_{12}, “C13” means palmarumycin C_{13}. “CK” means the control without any organic solvents. “-” means not applicable. “nd” means not detectable. The values are expressed as means ± standard deviations ($n = 3$). Different letters indicate significant differences among the treatments in each column at $p \leq 0.05$.

Table S3. Effects of butyl oleate on palmarumycin production in liquid culture of *Berkleasmium* sp. Dzf12.

Treatment	C12 Yield in Mycelia (mg/L)	C12 Yield in Aqueous Phase (mg/L)	C12 Yield in Organic Phase (mg/L)	C13 Yield in Mycelia (mg/L)	C13 Yield in Aqueous Phase (mg/L)	C13 Yield in Organic Phase (mg/L)	C12 Yield (mg/L)	C13 Yield (mg/L)	C12 Plus C13 Yield (mg/L)
CK	5.3 ± 2.0c	nd	-	7.6 ± 2.9a	24.6 ± 4.5a	-	5.3	32.1	37.5
5% added on day 0	3.5 ± 1.7c	3.2 ± 3.8bc	177.3 ± 9.5a	0.3 ± 0.0d	nd	nd	184.0	0.3	184.4
10% added on day 0	3.2 ± 0.9c	4.9 ± 1.0abc	132.3 ± 8.4bcd	0.2 ± 0.0d	nd	nd	140.4	0.2	140.6
15% added on day 0	4.1 ± 0.9c	3.6 ± 3.0bc	116.1 ± 12.5cde	0.1 ± 0.1d	nd	nd	123.8	0.1	123.9
5% added on day 3	23.2 ± 4.9ab	14.8 ± 3.3ab	153.5 ± 8.7ab	1.0 ± 0.2cd	nd	nd	191.6	1.0	192.5
10% added on day 3	34.2 ± 5.5a	16.9 ± 3.9a	139.4 ± 10.1bc	1.5 ± 0.4bcd	nd	nd	190.4	1.5	191.9
15% added on day 3	23.6 ± 7.0ab	16.7 ± 5.9a	127.6 ± 7.6bcd	0.8 ± 0.1d	nd	nd	167.8	0.8	168.6
5% added on day 6	17.1 ± 6.6bc	nd	136.3 ± 6.7bc	2.3 ± 0.4bcd	nd	nd	153.3	2.3	155.6
10% added on day 6	25.3 ± 4.8ab	nd	116.4 ± 7.1cde	2.1 ± 0.3bcd	nd	nd	141.8	2.1	143.9
15% added on day 6	21.4 ± 5.7ab	nd	82.5 ± 9.4f	0.9 ± 0.0cd	nd	nd	103.9	0.9	104.8
5% added on day 9	30.2 ± 5.4ab	nd	103.3 ± 5.9def	1.2 ± 0.1bcd	nd	nd	133.5	1.2	134.7
10% added on day 9	26.1 ± 6.0ab	nd	89.7 ± 17.2ef	1.6 ± 0.1bcd	nd	nd	115.8	1.6	117.3
15% added on day 9	24.8 ± 2.8ab	nd	73.0 ± 11.1f	1.9 ± 0.1bcd	nd	nd	97.7	1.9	99.7
5% added on day 12	19.2 ± 2.0abc	nd	34.9 ± 5.0g	3.6 ± 0.3b	nd	nd	54.1	3.6	57.7
10% added on day 12	21.9 ± 6.8ab	nd	31.0 ± 13.3g	3.4 ± 0.3bc	nd	nd	52.9	3.4	56.3
15% added on day 12	21.8 ± 5.9ab	nd	25.8 ± 8.6gh	3.6 ± 0.2b	nd	nd	47.6	3.6	51.2

Note: Butyl oleate was applied at 5%, 10% and 15% on days 0, 3, 6, 9 and 12 of culture, respectively. The period of culture lasted for 15 days. “C12” means palmarumycin C_{12}, “C13” means palmarumycin C_{13}. “CK” means the control without any organic solvents. “-” means not applicable. “nd” means not detectable. The values are expressed as means ± standard deviations (n = 3). Different letters indicate significant differences among the treatments in each column at $p \leq 0.05$.

Table S4. Effects of oleic acid on palmarumycin production in liquid culture of *Berkleasmium* sp. Dzf12.

Treatment	C12 Yield in Mycelia (mg/L)	C12 Yield in Aqueous Phase (mg/L)	C12 Yield in Organic Phase (mg/L)	C13 Yield in Mycelia (mg/L)	C13 Yield in Aqueous Phase (mg/L)	C13 Yield in Organic Phase (mg/L)	C12 Yield (mg/L)	C13 Yield (mg/L)	C12 Plus C13 Yield (mg/L)
CK	3.9 ± 1.2d	nd	-	8.5 ± 2.8a	25.3 ± 5.2a	-	3.9	33.8	37.8
5% added on day 0	22.4 ± 4.3bc	36.6 ± 4.6abc	125.6 ± 10.1a	0.1 ± 0.0b	nd	nd	184.6	0.1	184.7
10% added on day 0	32.8 ± 3.6ab	36.9 ± 6.8abc	93.6 ± 7.3bc	0.5 ± 0.1b	nd	nd	163.3	0.5	163.8
15% added on day 0	45.5 ± 8.1a	31.6 ± 3.4bcd	75.4 ± 5.5bcd	0.4 ± 0.1b	nd	nd	152.5	0.4	152.9
5% added on day 3	32.7 ± 5.2ab	26.2 ± 3.8cd	103.7 ± 11.2ab	0.3 ± 0.1b	nd	nd	162.6	0.3	162.9
10% added on day 3	24.4 ± 4.9bc	27.7 ± 4.9bcd	96.3 ± 13.2bc	0.6 ± 0.3b	nd	nd	148.4	0.6	148.9
15% added on day 3	25.3 ± 7.4bc	44.6 ± 7.8ab	85.6 ± 8.3bcd	0.1 ± 0.0b	nd	nd	155.4	0.1	155.5
5% added on day 6	14.9 ± 4.4bcd	39.5 ± 6.3abc	98.0 ± 10.2b	0.3 ± 0.1b	nd	nd	152.4	0.3	152.7
10% added on day 6	14.9 ± 3.7bcd	48.7 ± 4.1a	67.8 ± 6.8cd	0.1 ± 0.1b	nd	nd	131.3	0.1	131.5
15% added on day 6	17.2 ± 5.7bcd	37.2 ± 5.6abc	56.0 ± 10.2d	0.5 ± 0.2b	nd	nd	110.4	0.5	110.8
5% added on day 9	48.2 ± 7.6a	32.4 ± 4.0abcd	85.0 ± 7.5bcd	0.9 ± 0.3b	nd	nd	165.6	0.9	166.4
10% added on day 9	44.9 ± 5.1a	44.0 ± 6.2ab	83.1 ± 9.0bcd	1.5 ± 0.6b	nd	nd	172.0	1.5	173.5
15% added on day 9	44.7 ± 6.4a	34.7 ± 4.2abc	67.7 ± 11.0cd	1.0 ± 0.5b	nd	nd	147.0	1.0	148.0
5% added on day 12	12.5 ± 3.3cd	17.1 ± 2.9d	26.1 ± 6.1e	9.9 ± 2.3a	nd	nd	55.7	9.9	65.5
10% added on day 12	15.3 ± 4.2bcd	28.5 ± 4.7bcd	25.9 ± 7.3e	10.1 ± 3.0a	nd	nd	69.7	10.2	79.8
15% added on day 12	15.4 ± 5.2bcd	27.7 ± 4.4bcd	24.3 ± 8.5e	8.1 ± 2.5a	nd	nd	67.4	8.1	75.5

Note: Oleic acid was applied at 5%, 10% and 15% on days 0, 3, 6, 9 and 12 of culture, respectively. The period of culture lasted for 15 days. "C12" means palmarumycin C_{12}, "C13" means palmarumycin C_{13}. "CK" means the control without any organic solvents. "-" means not applicable. "nd" means not detectable. The values are expressed as means ± standard deviations ($n = 3$). Different letters indicate significant differences among the treatments in each column at $p \leq 0.05$.

Table S5. Effects of *n*-dodecane on palmarumycin production in liquid culture of *Berkleasmium* sp. Dzf12.

Treatment	C12 Yield in Mycelia (mg/L)	C12 Yield in Aqueous Phase (mg/L)	C12 Yield in Organic Phase (mg/L)	C13 Yield in Mycelia (mg/L)	C13 Yield in Aqueous Phase (mg/L)	C13 Yield in Organic Phase (mg/L)	C12 Yield (mg/L)	C13 Yield (mg/L)	C12 Plus C13 Yield (mg/L)
CK	5.8 ± 2.0bc	nd	-	6.5 ± 2.2d	23.7 ± 6.3abc	-	5.8	30.1	35.9
5% added on day 0	5.8 ± 2.3bc	nd	nd	23.6 ± 4.6bc	47.4 ± 10.2a	nd	5.8	71.0	76.7
10% added on day 0	5.9 ± 2.0bc	nd	nd	29.0 ± 5.2b	45.5 ± 8.2a	nd	5.9	74.4	80.3
15% added on day 0	7.2 ± 3.1bc	nd	nd	30.9 ± 3.2b	41.1 ± 6.2abc	nd	7.2	72.0	79.2
5% added on day 3	16.5 ± 4.9a	nd	nd	44.1 ± 9.4a	43.7 ± 5.4ab	nd	16.5	87.8	104.3
10% added on day 3	10.3 ± 4.0ab	nd	nd	10.1 ± 2.2cd	38.3 ± 12.1abc	nd	10.3	48.4	58.7
15% added on day 3	10.7 ± 2.7ab	nd	nd	11.4 ± 4.6cd	35.2 ± 7.9abc	nd	10.7	46.6	57.2
5% added on day 6	6.9 ± 2.1bc	nd	nd	17.7 ± 7.2bc	36.7 ± 6.6abc	nd	6.9	54.4	61.3
10% added on day 6	4.3 ± 2.0bc	nd	nd	7.0 ± 2.6d	31.7 ± 4.2abc	nd	4.3	38.7	43.0
15% added on day 6	3.9 ± 2.1bc	nd	nd	5.0 ± 2.0d	21.2 ± 8.3bc	nd	3.9	26.2	30.1
5% added on day 9	1.7 ± 0.9c	nd	nd	8.9 ± 2.9d	17.0 ± 6.2c	nd	1.7	25.9	27.6
10% added on day 9	1.3 ± 0.7c	nd	nd	8.5 ± 2.0d	19.3 ± 3.2c	nd	1.3	27.8	29.1
15% added on day 9	1.5 ± 1.0c	nd	nd	6.2 ± 3.0d	21.4 ± 4.0bc	nd	1.5	27.6	29.1
5% added on day 12	0.9 ± 0.1c	nd	nd	6.5 ± 2.3d	18.2 ± 8.8c	nd	0.9	24.7	25.5
10% added on day 12	1.0 ± 0.2c	nd	nd	9.1 ± 4.7d	17.9 ± 3.4c	nd	1.0	27.1	28.1
15% added on day 12	0.6 ± 0.1c	nd	nd	8.5 ± 4.1d	19.5 ± 4.2c	nd	0.6	28.0	28.6

Note: *n*-Dodecane was applied at 5%, 10% and 15% on days 0, 3, 6, 9 and 12 of culture, respectively. The period of culture lasted for 15 days. "C12" means palmarumycin C_{12}, "C13" means palmarumycin C_{13}. "CK" means the control without any organic solvents. "-" means not applicable. "nd" means not detectable. "0-1" means that the solvent was applied at 5% on day 0. The values are expressed as means ± standard deviations ($n = 3$). Different letters indicate significant differences among the treatments in each column at $p \leq 0.05$.

Table S6. Effects of *n*-hexadecane on palmarumycin production in liquid culture of *Berkleasmium* sp. Dzf12.

Treatment	C12 Yield in Mycelia (mg/L)	C12 Yield in Aqueous Phase (mg/L)	C12 Yield in Organic Phase (mg/L)	C13 Yield in Mycelia (mg/L)	C13 Yield in Aqueous Phase (mg/L)	C13 Yield in Organic Phase (mg/L)	C12 Yield (mg/L)	C13 Yield (mg/L)	C12 Plus C13 Yield (mg/L)
CK	4.6 ± 1.6c	0.0 ± 0.0c	-	10.6 ± 3.2a	21.2 ± 6.2cde	-	4.6	31.8	36.4
5% added on day 0	19.4 ± 5.2abc	8.1 ± 2.2bc	nd	2.3 ± 0.9b	42.9 ± 6.1ab	nd	27.5	45.2	72.7
10% added on day 0	25.9 ± 7.5ab	15.8 ± 5.2ab	nd	4.0 ± 1.3b	37.2 ± 9.7abcd	nd	41.7	41.2	82.9
15% added on day 0	16.9 ± 4.2bc	15.9 ± 4.7ab	nd	3.8 ± 1.6b	34.2 ± 4.8abcd	nd	32.8	38.0	70.7
5% added on day 3	17.6 ± 4.3bc	11.6 ± 3.1abc	nd	4.8 ± 1.0ab	46.8 ± 7.2a	nd	29.2	51.6	80.8
10% added on day 3	24.1 ± 6.8abc	12.2 ± 4.2abc	nd	7.2 ± 2.9ab	39.3 ± 5.5abc	nd	36.3	46.4	82.7
15% added on day 3	17.6 ± 3.9bc	9.4 ± 2.6abc	nd	6.5 ± 2.1ab	35.2 ± 6.2abcd	nd	27.0	41.7	68.6
5% added on day 6	23.8 ± 5.7abc	16.9 ± 5.4ab	nd	5.0 ± 2.1ab	36.7 ± 5.3abcd	nd	40.7	41.7	82.4
10% added on day 6	18.9 ± 4.9bc	6.1 ± 2.2bc	nd	4.9 ± 1.8ab	23.3 ± 8.8bcde	nd	25.0	28.2	53.1
15% added on day 6	18.2 ± 4.7bc	4.9 ± 1.7bc	nd	4.5 ± 2.0ab	22.6 ± 5.4bcde	nd	23.1	27.1	50.1
5% added on day 9	37.7 ± 8.7ab	9.5 ± 2.7abc	nd	2.3 ± 0.9b	18.2 ± 4.0de	nd	47.2	20.5	67.7
10% added on day 9	39.8 ± 7.6a	10.7 ± 3.1abc	nd	7.8 ± 2.0ab	17.5 ± 8.1de	nd	50.5	25.2	75.7
15% added on day 9	31.0 ± 9.0ab	22.3 ± 6.2a	nd	4.0 ± 1.3b	11.4 ± 6.2e	nd	53.3	15.3	68.6
5% added on day 12	35.3 ± 7.1ab	11.2 ± 2.3abc	nd	1.8 ± 1.0b	10.1 ± 4.6e	nd	46.5	11.9	58.5
10% added on day 12	37.2 ± 4.2ab	13.1 ± 3.8ab	nd	7.1 ± 2.0ab	8.4 ± 3.0e	nd	50.3	15.5	65.7
15% added on day 12	27.1 ± 6.1ab	16.0 ± 5.4ab	nd	3.8 ± 1.0b	7.4 ± 2.7e	nd	43.1	11.2	54.3

Note: *n*-Hexadecane was applied at 5%, 10% and 15% on days 0, 3, 6, 9 and 12 of culture, respectively. The period of culture lasted for 15 days. "C12" means palmarumycin C_{12}, "C13" means palmarumycin C_{13}. "CK" means the control without any organic solvents. "-" means not applicable. "nd" means not detectable. The values are expressed as means ± standard deviations (n = 3). Different letters indicate significant differences among the treatments in each column at $p \leq 0.05$.

Table S7. Effects of 1-hexadecene on palmarumycin production in liquid culture of *Berkleasmium* sp. Dzf12.

Treatment	C12 Yield in Mycelia (mg/L)	C12 Yield in Aqueous Phase (mg/L)	C12 Yield in Organic Phase (mg/L)	C13 Yield in Mycelia (mg/L)	C13 Yield in Aqueous Phase (mg/L)	C13 Yield in Organic Phase (mg/L)	C12 Yield (mg/L)	C13 Yield (mg/L)	C12 Plus C13 Yield (mg/L)
CK	6.5 ± 2.9ab	nd	-	7.8 ± 3.0fg	19.8 ± 6.2de	-	6.5	27.6	34.1
5% added on day 0	3.6 ± 1.7ab	nd	nd	13.3 ± 3.2efd	21.1 ± 5.8de	nd	3.6	34.4	38.0
10% added on day 0	2.7 ± 1.0ab	nd	nd	14.5 ± 3.1defg	25.5 ± 6.1cde	nd	2.7	39.9	42.5
15% added on day 0	1.9 ± 1.0b	nd	nd	7.1 ± 2.1g	19.5 ± 3.3de	nd	1.9	26.7	28.5
5% added on day 3	3.3 ± 1.9ab	nd	nd	24.3 ± 5.6bcdef	49.4 ± 9.1bc	nd	3.3	73.7	77.1
10% added on day 3	3.2 ± 1.6ab	nd	nd	25.2 ± 6.0bcde	53.8 ± 11.0b	nd	3.2	79.0	82.2
15% added on day 3	2.4 ± 1.4ab	nd	nd	11.9 ± 3.2efg	14.0 ± 3.8de	nd	2.4	25.9	28.4
5% added on day 6	3.3 ± 2.3ab	nd	nd	33.7 ± 6.2abc	93.4 ± 12.6a	nd	3.3	127.1	130.4
10% added on day 6	2.5 ± 1.2ab	nd	nd	37.2 ± 7.4ab	92.9 ± 14.0a	nd	2.5	130.1	132.6
15% added on day 6	6.0 ± 2.6ab	nd	nd	11.8 ± 3.8efg	27.4 ± 4.6cde	nd	6.0	39.3	45.3
5% added on day 9	4.7 ± 1.9ab	nd	nd	42.7 ± 9.5a	89.6 ± 10.8a	nd	4.7	132.3	137.0
10% added on day 9	6.9 ± 2.7ab	nd	nd	30.9 ± 5.5abcd	38.1 ± 6.6bcd	nd	6.9	69.0	75.8
15% added on day 9	4.8 ± 1.5ab	nd	nd	20.7 ± 4.1bcdefg	13.9 ± 3.3de	nd	4.8	34.5	39.3
5% added on day 12	8.9 ± 2.9ab	nd	nd	20.2 ± 4.6cdefg	24.0 ± 4.2de	nd	8.9	44.2	53.1
10% added on day 12	9.7 ± 3.1a	nd	nd	19.5 ± 3.4cdefg	21.3 ± 4.2de	nd	9.7	40.8	50.4
15% added on day 12	7.1 ± 2.6ab	nd	nd	14.6 ± 2.6defg	9.9 ± 3.3e	nd	7.1	24.5	31.6

Note: 1-Hexadecene was applied at 5%, 10% and 15% on days 0, 3, 6, 9 and 12 of culture, respectively. The period of culture lasted for 15 days. “C12” means palmarumycin C_{12}, “C13” means palmarumycin C_{13}. “CK” means the control without any organic solvents. “-” means not applicable. “nd” means not detectable. The values are expressed as means ± standard deviations (n = 3). Different letters indicate significant differences among the treatments in each column at $p \leq 0.05$.

Table S8. Effects of liquid paraffin on palmarumycin production in liquid culture of *Berkleasmium* sp. Dzf12.

Treatment	C12 Yield in Mycelia (mg/L)	C12 Yield in Aqueous Phase (mg/L)	C12 Yield in Organic Phase (mg/L)	C13 Yield in Mycelia (mg/L)	C13 Yield in Aqueous Phase (mg/L)	C13 Yield in Organic Phase (mg/L)	C12 Yield (mg/L)	C13 Yield (mg/L)	C12 Plus C13 Yield (mg/L)
CK	6.0 ± 3.0a	nd	-	8.8 ± 3.5d	22.0 ± 8.2c	-	6.0	30.8	36.9
5% added on day 0	10.5 ± 3.6a	nd	nd	43.9 ± 9.8abc	77.9 ± 7.1a	nd	10.5	121.8	132.2
10% added on day 0	10.0 ± 3.9a	nd	nd	52.5 ± 6.1a	80.3 ± 12.3a	nd	10.0	132.7	142.8
15% added on day 0	9.2 ± 3.0a	nd	nd	47.8 ± 10.2ab	84.7 ± 9.3a	nd	9.2	132.4	141.6
5% added on day 3	12.3 ± 4.1a	nd	nd	40.6 ± 6.6abc	78.4 ± 7.9a	nd	12.3	119.0	131.3
10% added on day 3	11.2 ± 3.8a	nd	nd	51.1 ± 8.3a	83.0 ± 5.2a	nd	11.2	134.1	145.3
15% added on day 3	10.7 ± 3.2a	nd	nd	36.6 ± 4.8abc	67.1 ± 9.7ab	nd	10.7	103.7	114.4
5% added on day 6	7.5 ± 2.7a	nd	nd	47.3 ± 9.5abc	83.4 ± 9.2a	nd	7.5	130.6	138.2
10% added on day 6	6.3 ± 2.9a	nd	nd	32.8 ± 6.1abc	87.8 ± 8.3a	nd	6.3	120.6	126.9
15% added on day 6	3.7 ± 1.9a	nd	nd	30.2 ± 5.6abcd	73.6 ± 7.0a	nd	3.7	103.9	107.6
5% added on day 9	4.4 ± 1.8a	nd	nd	26.0 ± 5.3bcd	60.3 ± 7.4ab	nd	4.4	86.2	90.7
10% added on day 9	5.3 ± 2.1a	nd	nd	29.8 ± 7.1abcd	67.7 ± 11.4ab	nd	5.3	97.6	102.9
15% added on day 9	6.1 ± 2.9a	nd	nd	32.0 ± 2.1abcd	62.5 ± 5.2ab	nd	6.1	94.4	100.5
5% added on day 12	7.7 ± 2.8a	nd	nd	23.4 ± 6.4cd	41.9 ± 8.9bc	nd	7.7	65.3	73.0
10% added on day 12	6.9 ± 2.8a	nd	nd	32.5 ± 8.5abc	32.3 ± 6.3c	nd	6.9	64.8	71.7
15% added on day 12	3.8 ± 1.9a	nd	nd	27.1 ± 5.7bcd	33.3 ± 5.5c	nd	3.8	60.4	64.2

Note: Liquid paraffin was applied at 5%, 10% and 15% on days 0, 3, 6, 9 and 12 of culture, respectively. The period of culture lasted for 15 days. “C12” means palmarumycin C_{12}, “C13” means palmarumycin C_{13}. “CK” means the control without any organic solvents. “-” means not applicable. “nd” means not detectable. The values are expressed as means ± standard deviations ($n = 3$). Different letters indicate significant differences among the treatments in each column at $p \leq 0.05$.

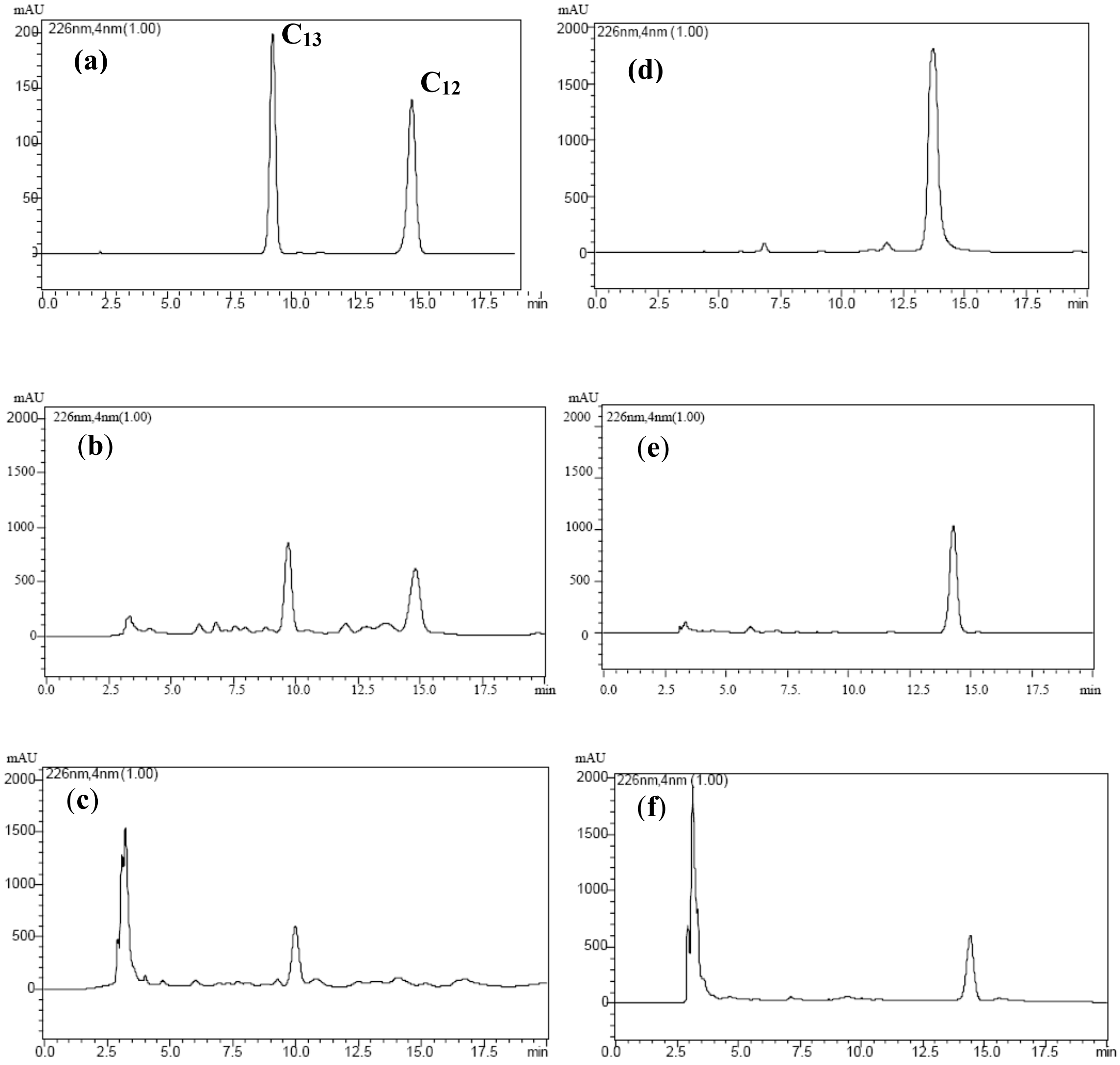

Figure S1. HPLC analysis of palmarumycin production in liquid culture of *Berkleasmium* sp. Dzf12 with oleic acid as the water-immiscible organic solvent. (**a**): Palmarumycins C_{12} and C_{13}; (**b**): Mycelia extract without addition of oleic acid; (**c**): Broth extract without addition of oleic acid; (**d**): Extract of oleic acid phase; (**e**): Mycelia extract with addition of oleic acid; (**f**): Broth extract with addition of oleic acid.