

# Chapter IV

## Results

### 1 The Plant extraction

The characteristic of the plants extracts are summarized in the **Table 6**

**Table 6.** The characteristic of the plant extracts

Plants	Extract characteristic
<i>P. mirifica</i>	Sticky wax-like material with brownish color. Smell-like ground peanut.
<i>P. lobata</i>	Sticky wax-like material with light brownish color. Smell-like ground peanut.
<i>B. superba</i>	Sticky wax-like material with dark brownish color. Smell-like ground peanut
<i>M. collettii</i>	Sticky wax-like crystal with blackish color. Very strong smell.

### 2. Cytotoxicity test

#### 2.1 MCF-7

##### 2.1.1 Estradiol

Estradiol shows no significant proliferative effect at the concentrations  $10^{-12}$ - $10^{-6}$  M. but shows anti-proliferative effect at the concentration of  $10^{-4}$  M ( $p < 0.01$ ) The response of the cells trended to be proliferative at  $10^{-11}$ M. (**Table 7 and Figure 4**)

### 2.1.2 *P. mirifica*

*P. mirifica* extract shows clearly biphasic effect with MCF-7 cell culture. The extract stimulates the cellular proliferation at the concentration of 1  $\mu\text{g/ml}$  ( $p < 0.05$ ) and inhibits the cellular proliferation at the concentrations of 100 and 1000  $\mu\text{g/ml}$  ( $p < 0.05$  and  $p < 0.01$ , respectively) with the  $\text{ED}_{50}$  value 642.83  $\mu\text{g/ml}$  (Table 8 and Figure 5.)

### 2.1.3 *P. lobata*

*P. lobata* extract shows no proliferative effect. The extract inhibits the cellular proliferation at the concentration of 1000  $\mu\text{g/ml}$  ( $p < 0.01$ ) with the  $\text{ED}_{50}$  value out of range of 1000  $\mu\text{g/ml}$ . (Table 9 and Figure 6.)

### 2.1.4 *B. superba*

*B. superba* extract shows only anti-proliferative effect at the concentrations of 10-1000  $\mu\text{g/ml}$  ( $p < 0.01$ ) with the  $\text{ED}_{50}$  value 370.91  $\mu\text{g/ml}$ . (Table 10 and Figure 7)

### 2.1.5 *M. collettii*

*M. collettii* extract shows no significant proliferative effect. The extract inhibits the cellular proliferation at the concentrations of 100 and 1000  $\mu\text{g/ml}$  ( $p < 0.01$ ) with the  $\text{ED}_{50}$  value 85.36  $\mu\text{g/ml}$ . (Table 11 and Figure 8.)

### 2.1.6 Comparison the effects of *P. mirifica* extract on MCF-7 cell with the others at the same concentration

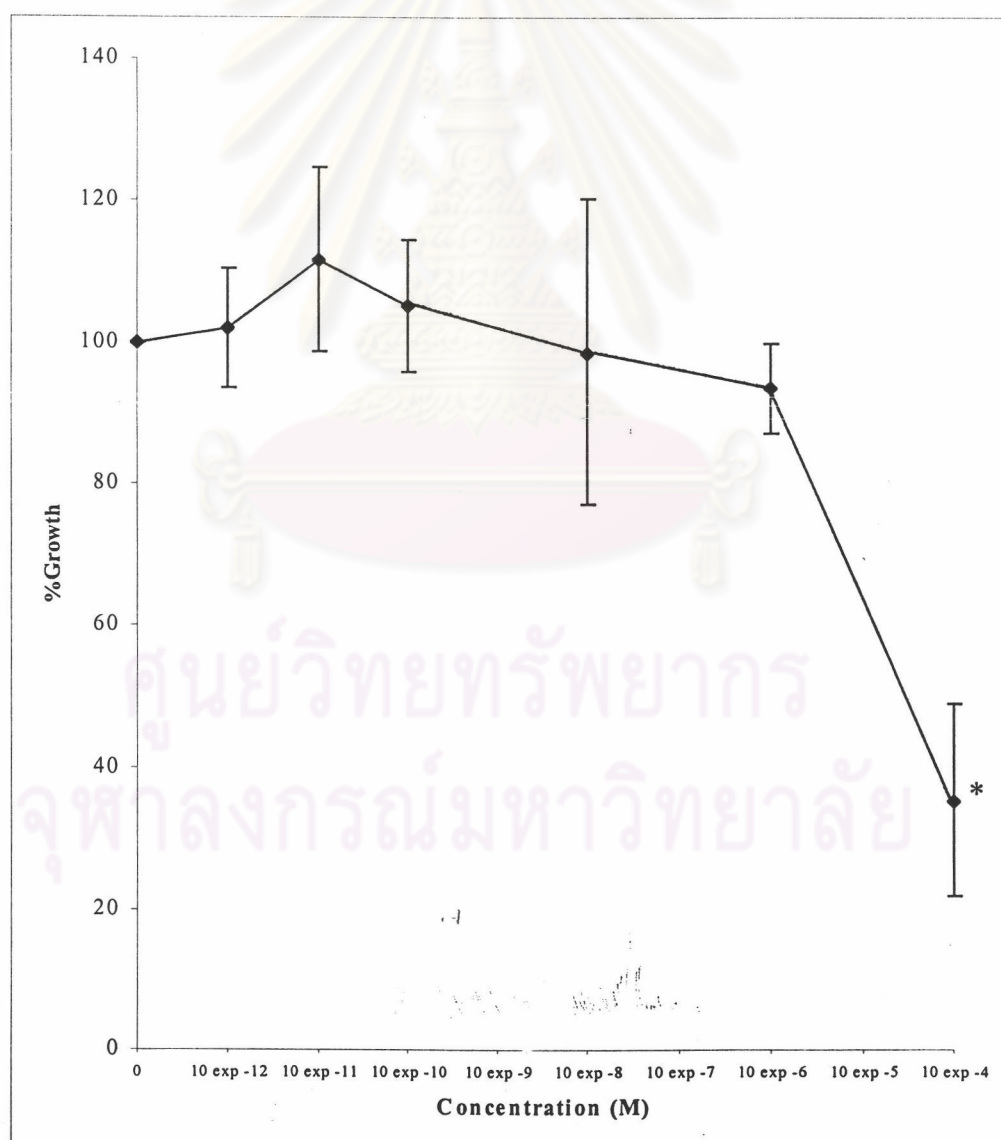
*P. mirifica* shows significant proliferative effect at 1  $\mu\text{g/ml}$  compared with the others. *P. lobata* shows significant low proliferative effect at 1  $\mu\text{g/ml}$  ( $p < 0.01$ ) and significant low antiproliferative effect at 1000  $\mu\text{g/ml}$  ( $p < 0.05$ ) compared with *P. mirifica* extract. *B. superba* shows significant antiproliferative effect ( $p < 0.05$  at 0.1  $\mu\text{g/ml}$  and  $p < 0.01$  at 10-1000  $\mu\text{g/ml}$ ) compared with *P. mirifica* extract. *M.collettii* shows significant low proliferative effect at 1  $\mu\text{g/ml}$  ( $p < 0.05$ ) and significant high antiproliferative effect ( $p < 0.05$  at 100  $\text{mg/ml}$  and  $p < 0.01$  at 1000  $\mu\text{g/ml}$ ) (Table 12 and Figure 9)



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**Table 7** The growth response percentage of MCF-7 cell culture to estradiol

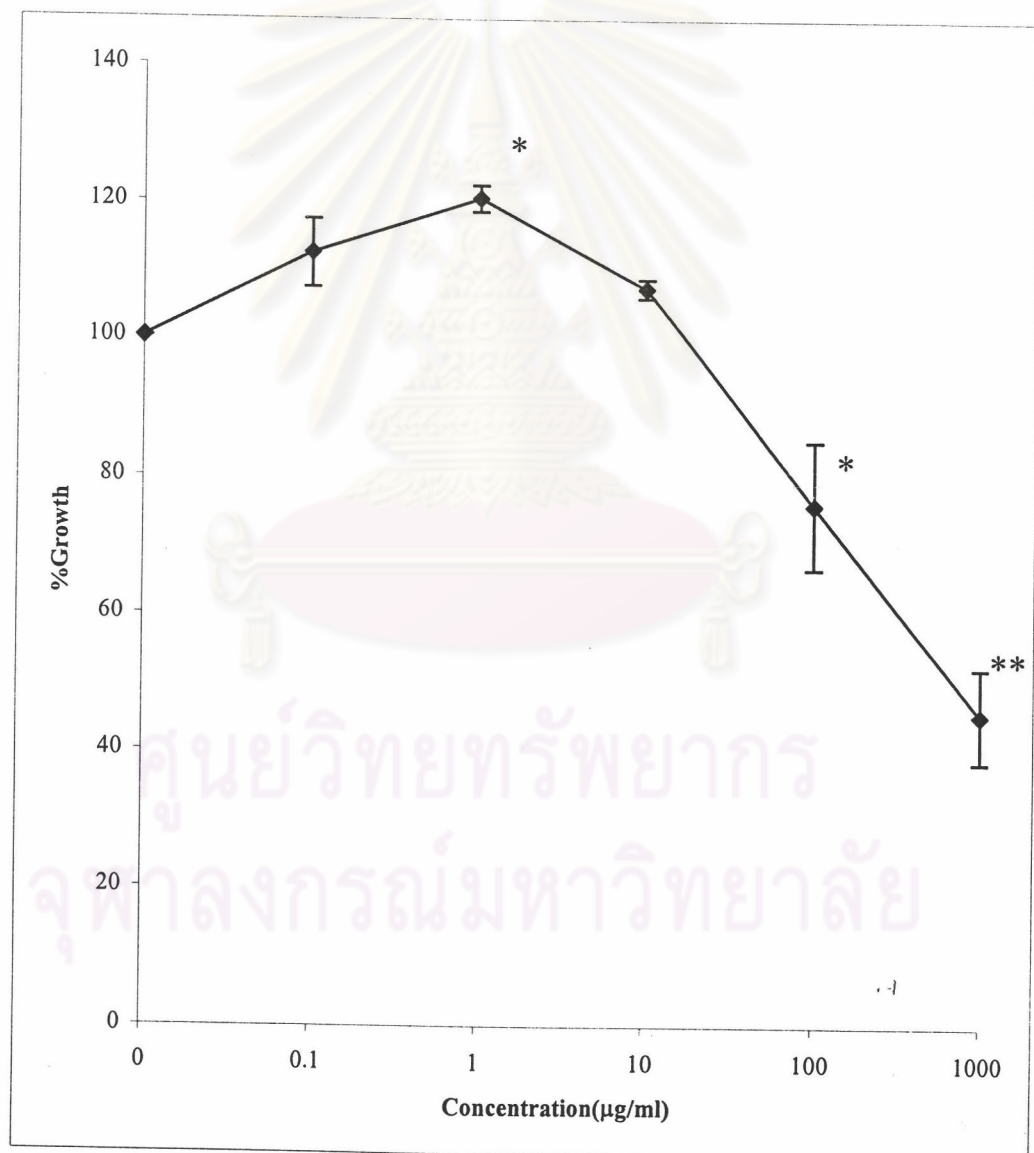
Concentration	Exp. 1	Exp. 2	Exp. 3	mean	se
0	100	100	100	100	0
$10^{-12}$	110.536	102.05	93.51	102.032	8.513
$10^{-11}$	125.878	100.79	108.44	111.7027	12.8583
$10^{-10}$	114.972	104.42	96.54	105.3107	9.2482
$10^{-8}$	115.712	74.25	106.06	98.674	21.6954
$10^{-6}$	98.366	86.41	95.89	93.55533	6.3107
$10^{-4}$	51.017	28.28	27.06	35.45233	13.4932

**Figure 4** Effect of estradiol on the growth of MCF-7 cell culture. ( Mean  $\pm$  SE ; \* p < 0.05)

**Table 8.** The growth response percentage of MCF-7 cell culture to *P. mirifica* extract

Concentration ( $\mu\text{g/ml}$ )	Exp. 1	Exp. 2	Exp. 3	MEAN	SE
0	100	100	100	100	0
0.1	112.05	121.25	103.85	112.38333	5.0257
1	120.78	123.75	116.92	120.48333	1.9772
10	105.42	110.00	106.67	107.36333	1.3668
100	58.13	81.35	88.72	76.066667	9.2172
1000	35.84	58.75	41.54	45.376667	6.8861

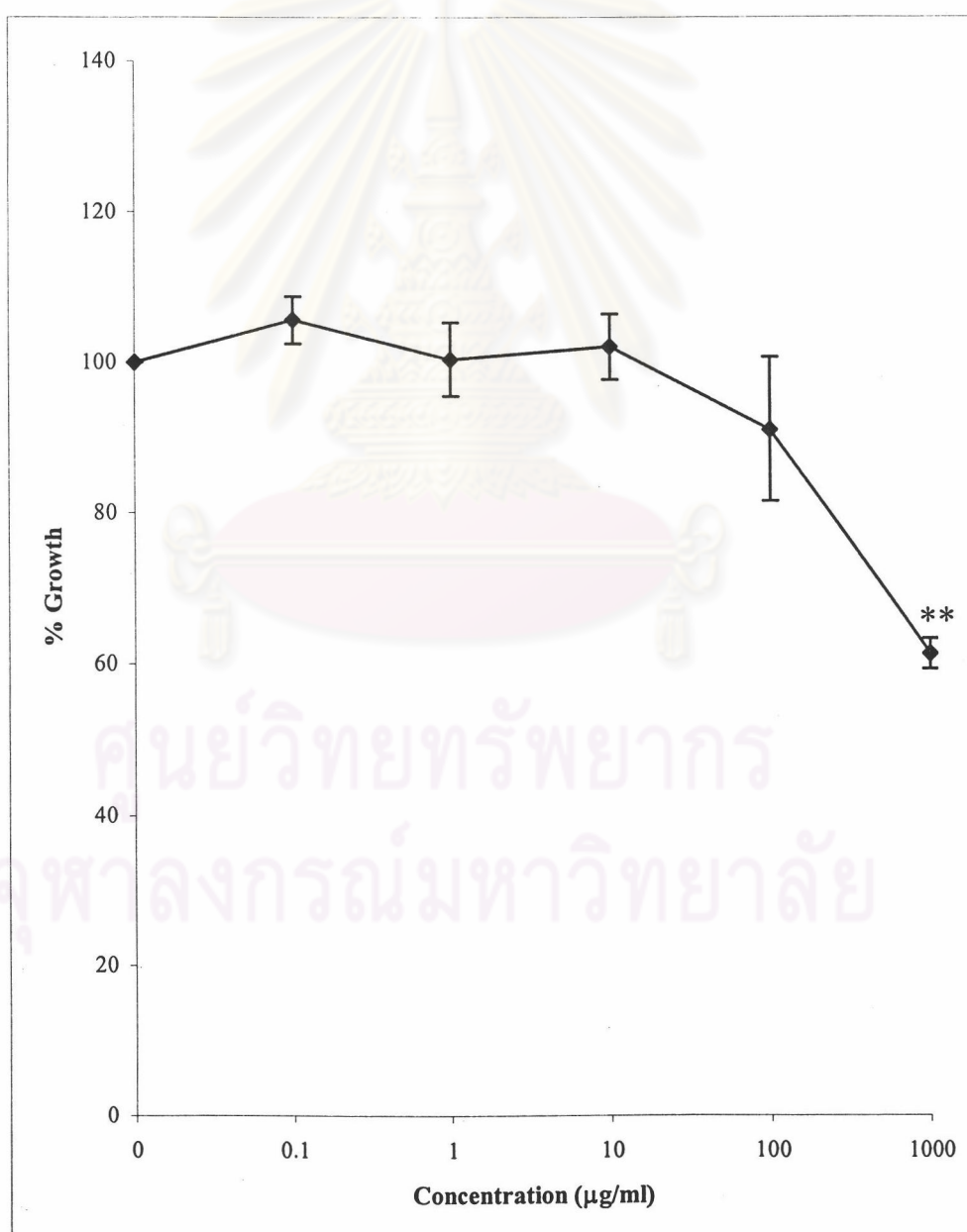
**Figure 5.** Effect of *P. mirifica* extract on the growth of MCF-7 cell culture (Mean  $\pm$  SE; \*  $p < 0.05$ , \*\*  $p < 0.01$ )



**Table 9.** The growth response percentage of MCF-7 cell culture to *P. lobata* extract

Concentration ( $\mu\text{g/ml}$ )	Exp. 1	Exp. 2	Exp. 3	MEAN	SE
0	100	100	100	100	0
0.1	111.31	100.58	104.82	105.57	3.12
1	109.98	97.1	94.22	100.4333	4.85
10	108.426	93.76	104.17	102.1187	4.36
100	104.88	95.65	72.71	91.08	9.56
1000	60.98	57.91	64.76	61.2167	1.98

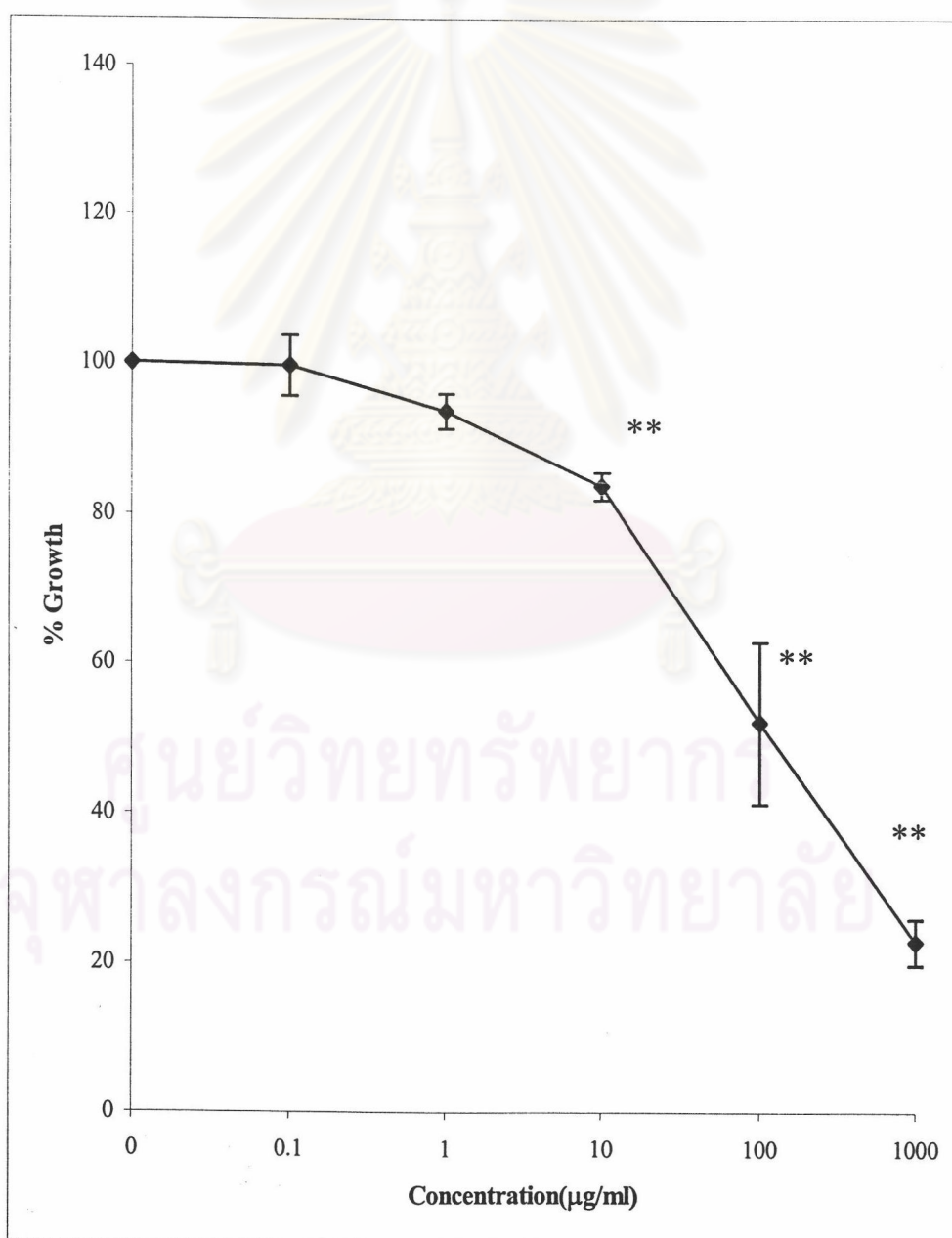
**Figure 6.** Effect of *P. lobata* extract on the growth of MCF-7 cell culture (Mean  $\pm$  SE; \*\*  $p < 0.01$ )



**Table 10.** The growth response percentage of MCF-7 cell culture to *B. superba* extract

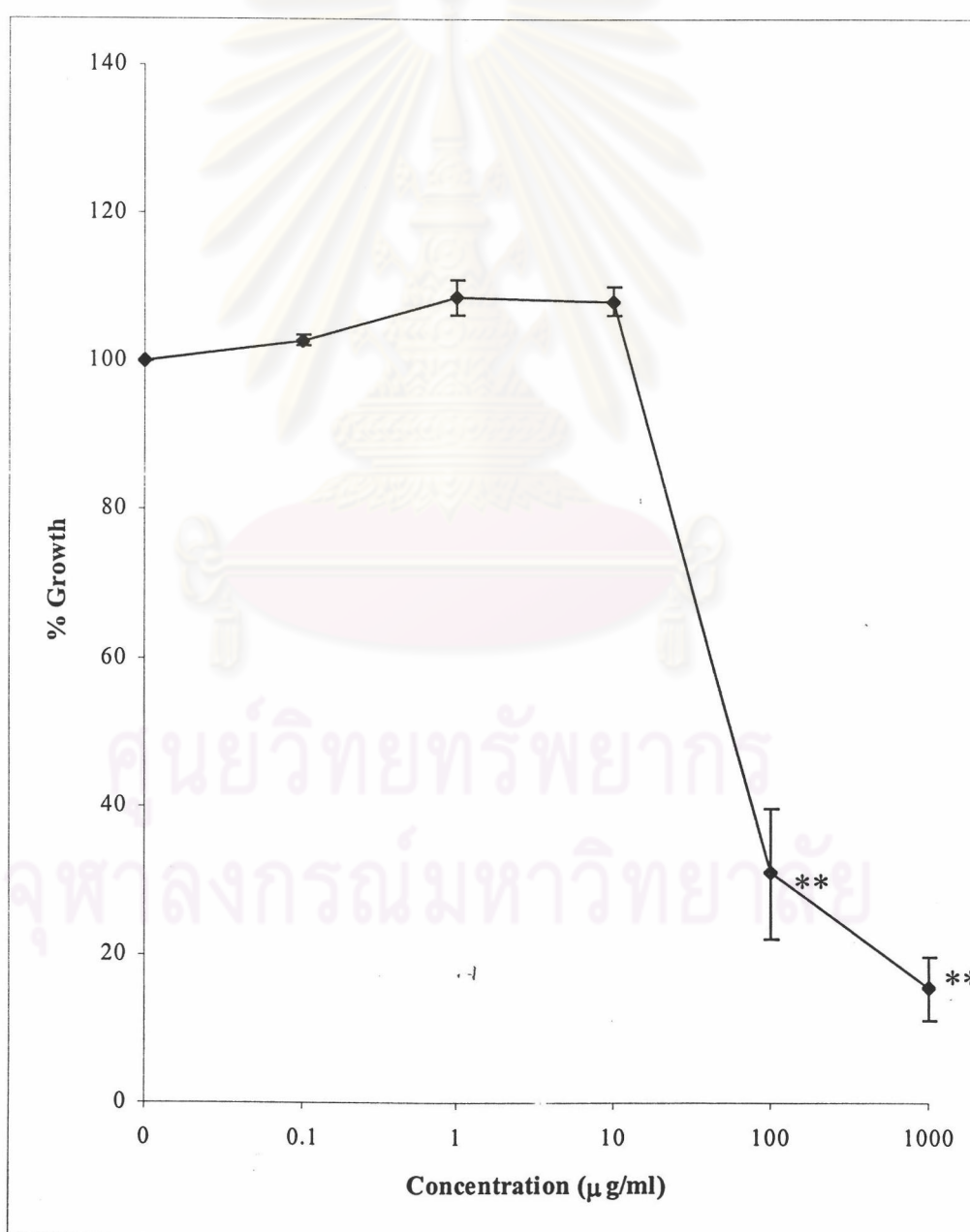
Concentration ( $\mu\text{g/ml}$ )	Exp.1	Exp. 2	Exp. 3	MEAN	SE
0	100	100	100	100	0
0.1	100.84	92.13	105.99	99.65333	4.0448
1	89.11	95.41	96.48	93.66667	2.2992
10	82.96	87.27	81.09	83.77333	1.8298
100	46.5	72.83	36.54	51.95667	10.8255
1000	24.3	27.3	16.93	22.84333	3.0809

**Figure 7.** Effect of *B. superba* extract on the growth of MCF-7 cell culture (Mean  $\pm$  SE; \*\*  $p < 0.01$ )



**Table 11.** The growth response percentage of MCF-7 cell culture to *M. collettii* extract.

Concentration ( $\mu\text{g/ml}$ )	Exp. 1	Exp. 2	Exp. 3	MEAN	SE
0	100	100	100	100	0
0.1	103.21	103.77	101.3889	102.7896	0.7187
1	105.49	106.81	113.3681	108.556	2.436
10	109.05	110.83	104.3403	108.0734	1.9361
100	27.02	17.76	47.91667	30.89889	8.9187
1000	23.32	8.27	14.58333	15.39111	4.3633

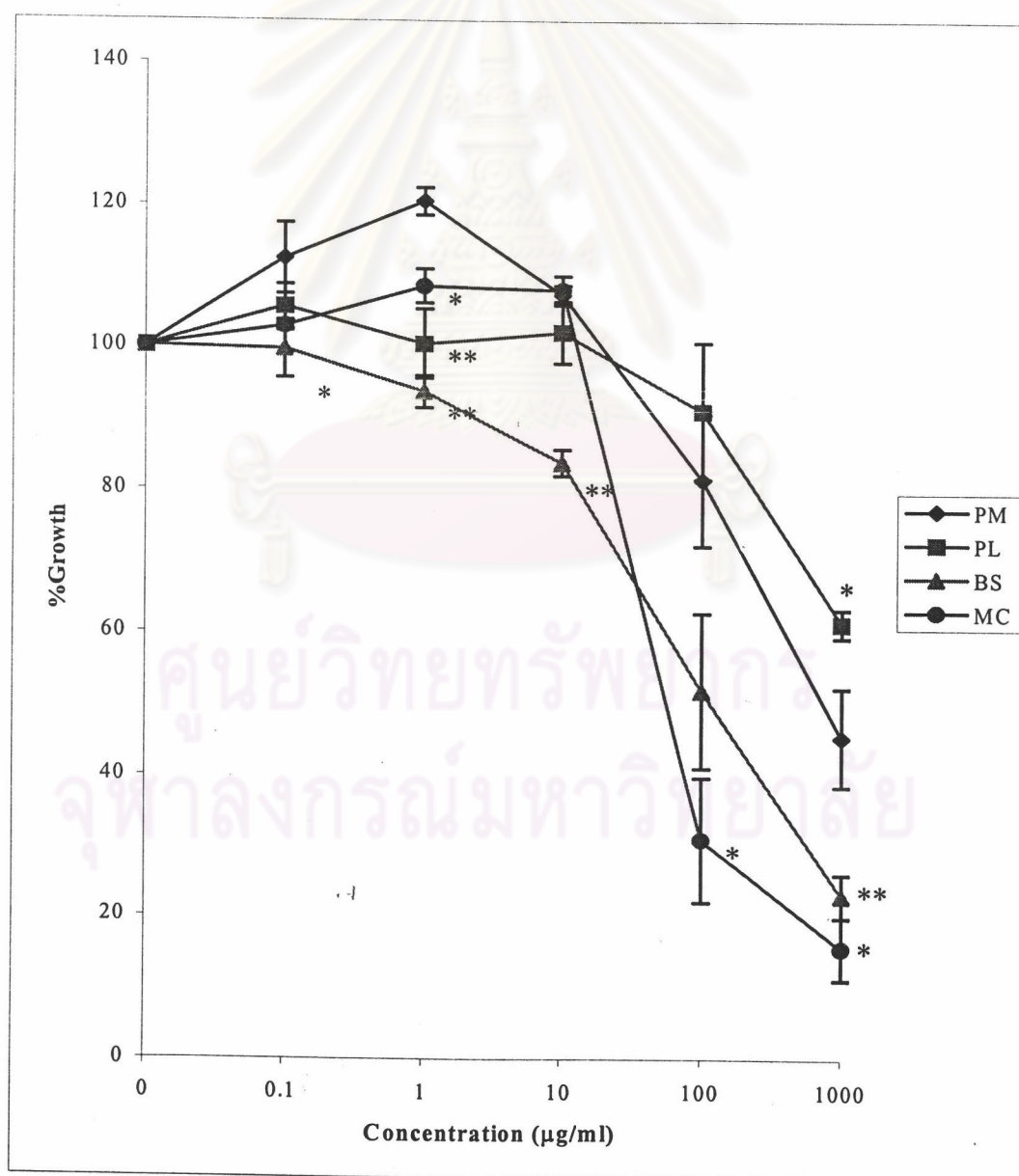
**Figure 8.** Effect of *M. collettii* extract on the growth of MCF-7 cell culture (Mean  $\pm$  SE; \*  $p < 0.05$ , \*\*  $p < 0.01$ )



**Table 12.** Comparative dose response of *P. mirifica*, with *P. lobata*, *B. superba* and *M. collettii* extracts to MCF-7 at D<sub>4</sub> of experiment. (MEAN ± SE, \* p < 0.05, \*\* p < 0.01)

Species	Concentration (µg/ml)				
	0.1	1	10	100	1000
<i>P. mirifica</i>	112.38 ± 5.03	120.48 ± 1.98	107.36 ± 1.37	81.35 ± 9.22	45.38 ± 6.89
<i>P. lobata</i>	105.57 ± 3.12	100.43 ± 4.85**	102.12 ± 4.36	91.08 ± 9.56	61.22 ± 1.98*
<i>B. superba</i>	99.65 ± 4.04 *	93.67 ± 2.30**	83.77 ± 1.83**	51.96 ± 10.83	22.84 ± 3.08**
<i>M. collettii</i>	102.88 ± 0.72	128.56 ± 2.44*	108.07 ± 1.94	30.90 ± 8.92*	15.39 ± 4.36**

**Figure 9** Comparative dose response of *P. mirifica* (PM), *P. lobata* (PL), *B. superba* (BS) and *M. collettii* (MC) extract on the growth of MCF-7 cell culture (MEAN ± SE; \* p < 0.05, \*\* p < 0.01)



## 2.2 HeLa

### 2.2.1 Estradiol

Estradiol shows no proliferative effect at the concentrations  $10^{-12}$ - $10^{-8}$  M but shows anti-proliferative effect at the concentration  $10^{-4}$  M ( $p < 0.01$ ) (Table 13 and Figure 10)

### 2.2.2 *P. mirifica*

*P. mirifica* extract shows no proliferative effect but inhibits cellular proliferation significantly at the concentrations of 100 and 1000  $\mu\text{g/ml}$  ( $p < 0.01$ ) with the  $\text{ED}_{50}$  value out of range of 1000  $\mu\text{g/ml}$ . (Table 14 and Figure 11.)

### 2.2.3 *P. lobata*

*P. lobata* extract shows no effect on the growth of HeLa cell line. The  $\text{ED}_{50}$  value out of range of 1000  $\mu\text{g/ml}$ . (Table 15 and Figure 12.)

### 2.2.4 *B. superba*

*B. superba* extract shows no proliferative effect but inhibit cellular proliferation at the concentration 1000  $\mu\text{g/ml}$  ( $p < 0.01$ ) with the  $\text{ED}_{50}$  value out of range of 1000  $\mu\text{g/ml}$ . (Table 16 and Figure 13)

### 2.2.5 *M. collettii*

*M. collettii* extract shows no proliferative effect but inhibit cellular proliferation at the concentration 1000  $\mu\text{g/ml}$  ( $p < 0.01$ ) with the  $\text{ED}_{50}$  value 393.85  $\mu\text{g/ml}$ . (Table 17 and Figure 14.)

### 2.2.6 Comparison of the effects of *P. mirifica* extract on HeLa cell with the others at the same concentration

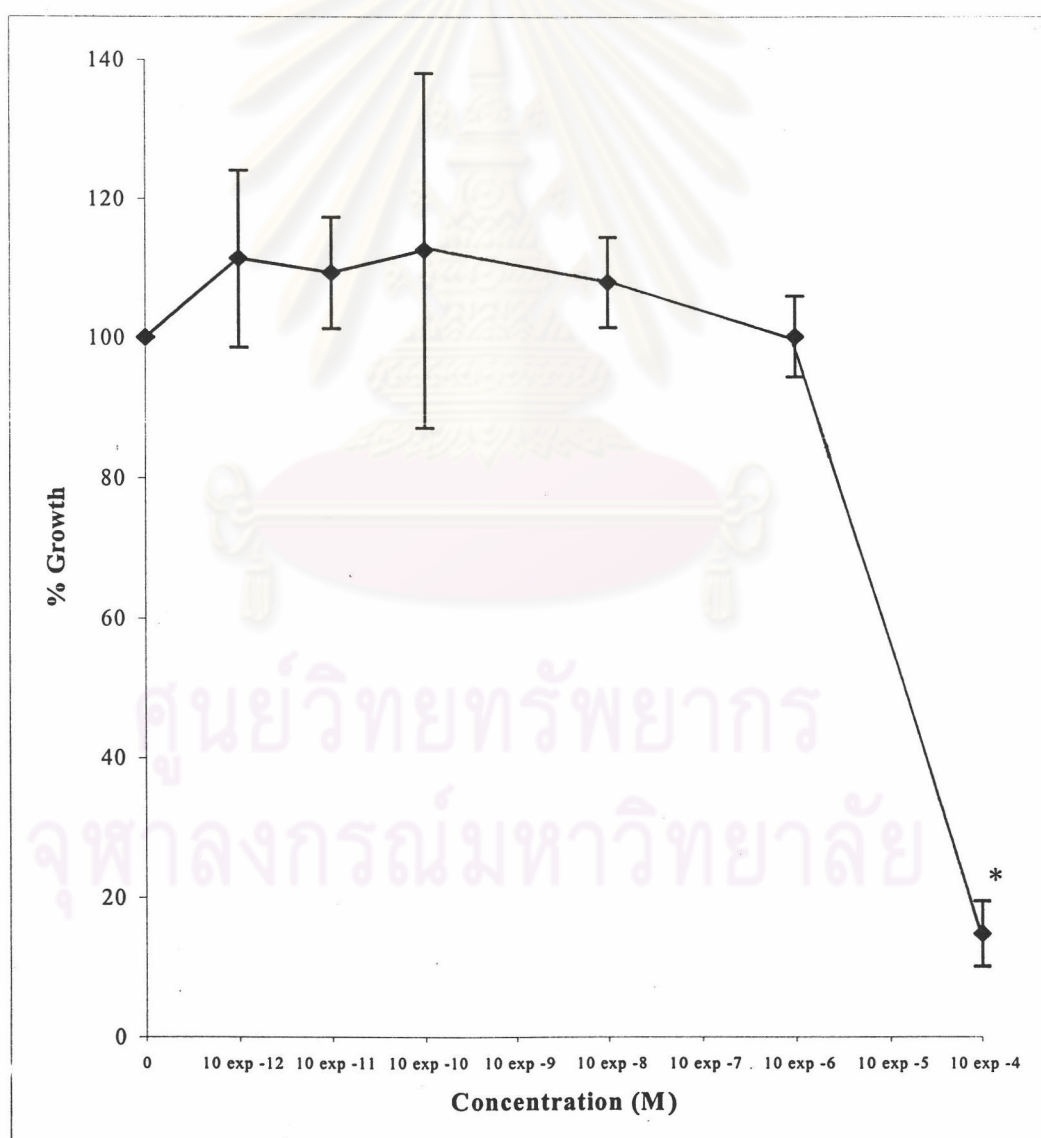
*P. mirifica* shows non-significant proliferative effect at 0.1-1  $\mu\text{g/ml}$  as compared with the others. *P. lobata* shows significant low antiproliferative effect at 100  $\text{mg/ml}$  ( $p < 0.05$ ) and 1000  $\mu\text{g/ml}$  ( $p < 0.01$ ) as compared with *P. mirifica* extract. *B. superba* shows non-significant antiproliferative effect as compared with *P. mirifica* extract. *M.collettii* shows significant high antiproliferative effect ( $p < 0.05$  at 1000  $\mu\text{g/ml}$  (**Table 18** and **Figure 15**))



**Table 13.** The growth response percentage of HeLa cell to estradiol.  
(Mean  $\pm$  SE; \*  $p < 0.05$ )

Concentration (M)	Exp 1	Exp2	Exp3	Mean	SE
0	100	100	100	100	0
$10^{-12}$	107.363	101.072	125.5278	111.3209	12.6992
$10^{-11}$	105.546	103.828	118.4261	109.2667	7.9787
$10^{-10}$	103.193	93.109	141.4587	112.5869	25.507
$10^{-8}$	105.21	103.369	115.3551	107.978	6.4547
$10^{-6}$	97.647	96.018	106.7179	100.1276	5.7652
$10^{-4}$	16.975	17.917	9.40499	14.76566	4.6663

**Figure 10.** Effect of estradiol on the growth of HeLa cell line (Mean  $\pm$  SE; \*  $p < 0.05$ )

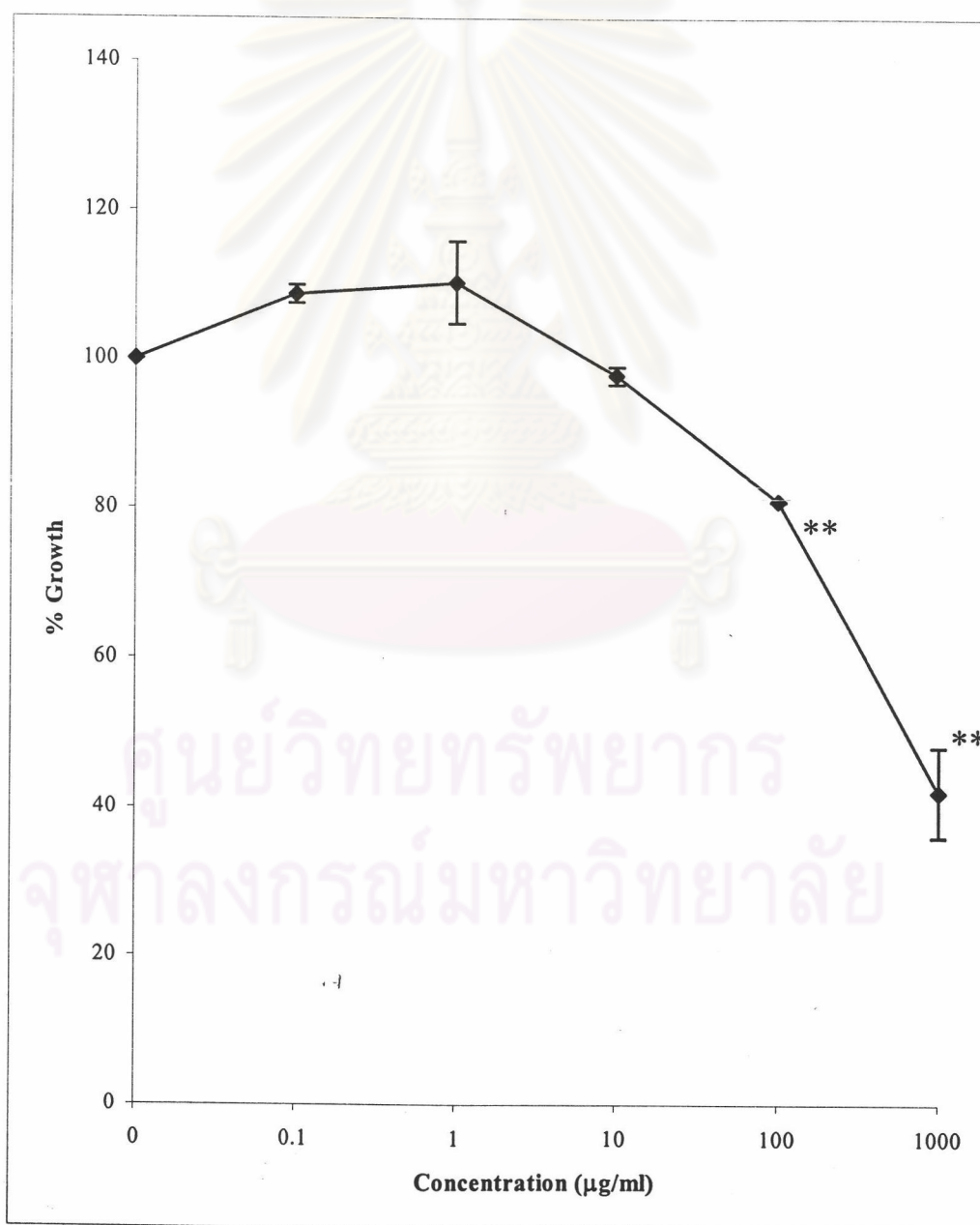


**Table 14.** The growth response percentage of HeLa cell culture to *P. mirifica* extract.

Concentration ( $\mu\text{g/ml}$ )	Exp. 1	Exp2	Exp3	Mean	SE
0	100	100	100	100	0
0.1	111.092	107.81	107.2937	108.7319	1.1894
1	114.454	99.387	117.2745	110.3718	5.5524
10	98.992	99.234	95.58541	97.93714	1.1779
100	81.008	80.858	80.99808	80.95469	0.04842
1000	47.227	48.851	29.94242	42.00681	6.0514

**Figure 11.** Effect of *P. mirifica* extract on the growth of HeLa cell culture

(Mean  $\pm$  SE; \*\*  $p < 0.01$ )



**Table 15.** The growth response percentage of HeLa cell culture to *P. lobata* extract

Concentration ( $\mu\text{g/ml}$ )	Exp 1	Exp2	Exp3	Mean	SE
0	100	100	100	100	0
0.1	106.555	95.1	103.8388	101.8313	3.4558
1	115.798	98.315	93.28215	102.465	6.823
10	110.252	96.478	88.67562	98.46854	6.3057
100	122.689	94.334	95.77735	104.2668	9.2212
1000	80.84	77.489	95.0096	84.4462	5.3695

**Figure 12.** Effect of *P. lobata* extract on the growth of HeLa cell culture (Mean  $\pm$  SE)

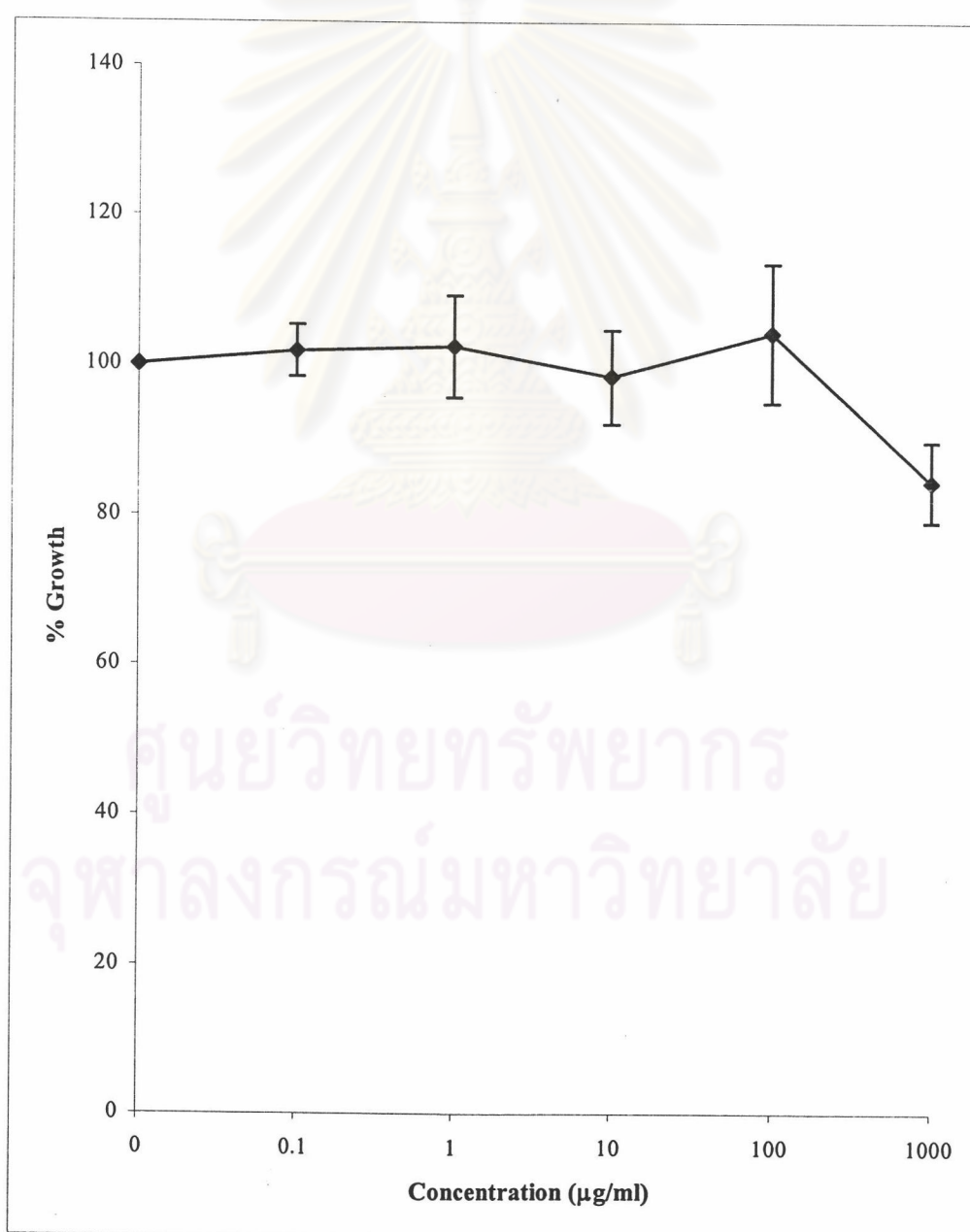


Table 16. The growth response percentage of HeLa cell culture to *B. superba* extract.

Concentration ( $\mu\text{g/ml}$ )	Exp 1	Exp2	Exp3	Mean	SE
0	100	100	100	100	0
0.1	96.975	100	103.4549	100.1433	1.872
1	101.345	100.919	96.92898	99.73099	1.4072
10	95.966	103.675	103.071	100.904	2.4746
100	95.966	107.504	89.25144	97.57381	5.329
1000	31.092	48.239	35.12476	38.15192	5.1774

Figure 13. Effect of *B. superba* extract on the growth of HeLa cell culture

(Mean  $\pm$  SE; \*\*  $p < 0.01$ )

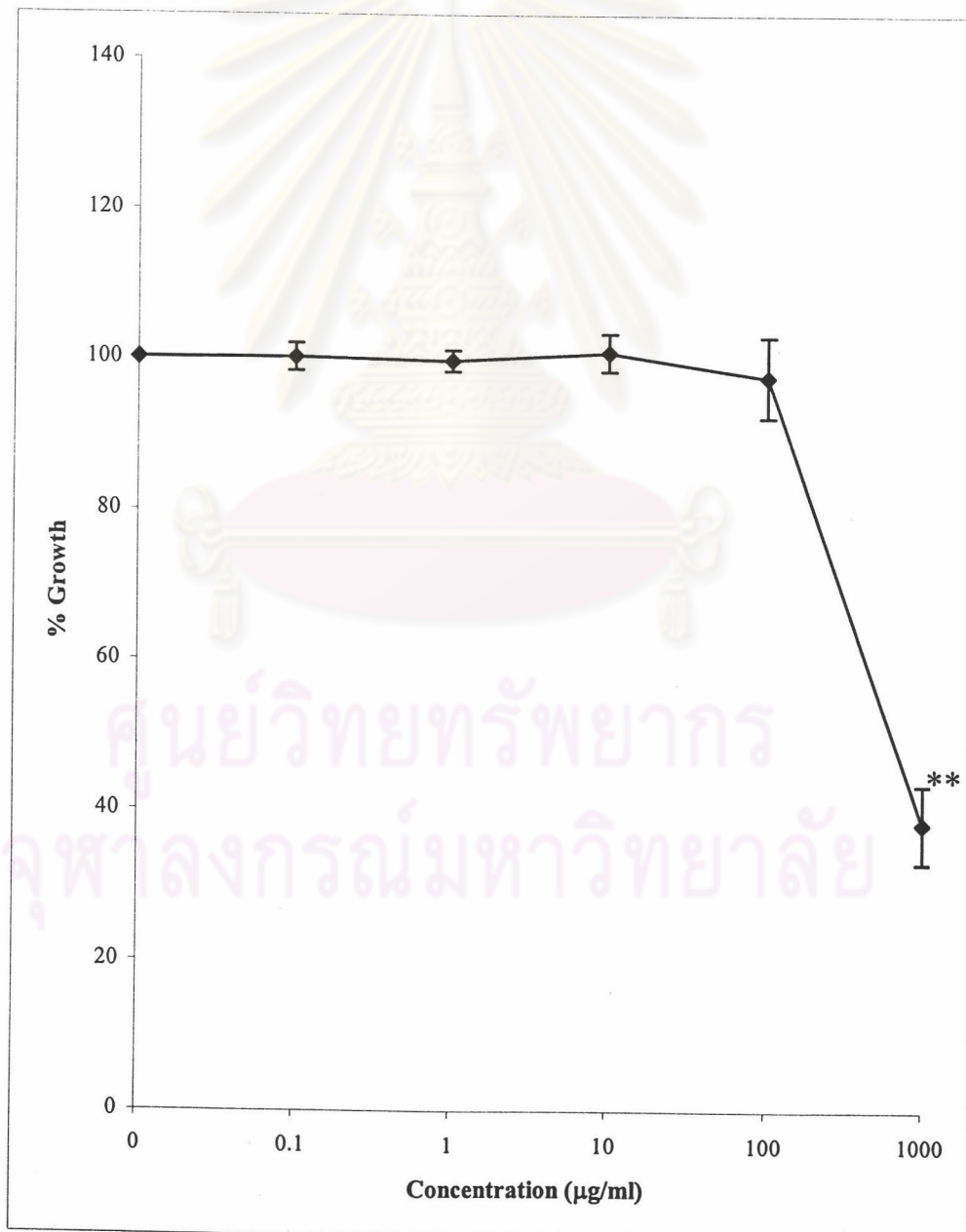
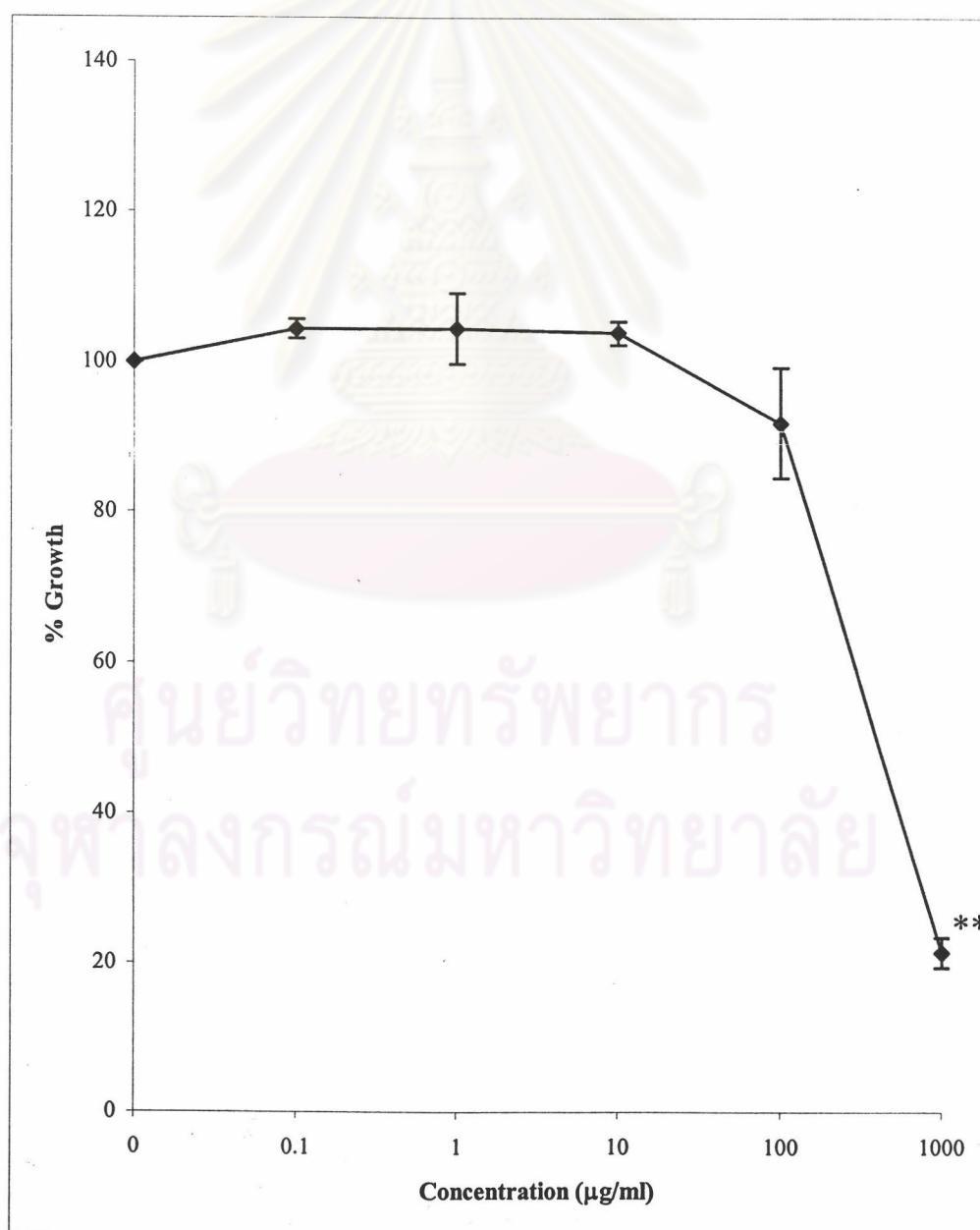


Table 17. The growth response percentage of Hela cell culture to *M. collettii* extract

Concentration (mg/ml)	Exp 1	Exp2	Exp3	Mean	SE
0	100	100	100	100	0
0.1	103.529	106.891	102.6871	104.369	1.3126
1	111.092	106.891	95.39347	104.4588	4.6927
10	103.361	101.531	106.9098	103.9339	1.5793
100	77.479	96.325	101.9194	91.9078	7.3933
1000	20.336	18.377	25.14395	21.28565	2.008

Figure 14. Effect of *M. collettii* extract on the growth of HeLa cell culture

(Mean  $\pm$  SE; \*\* p < 0.01)



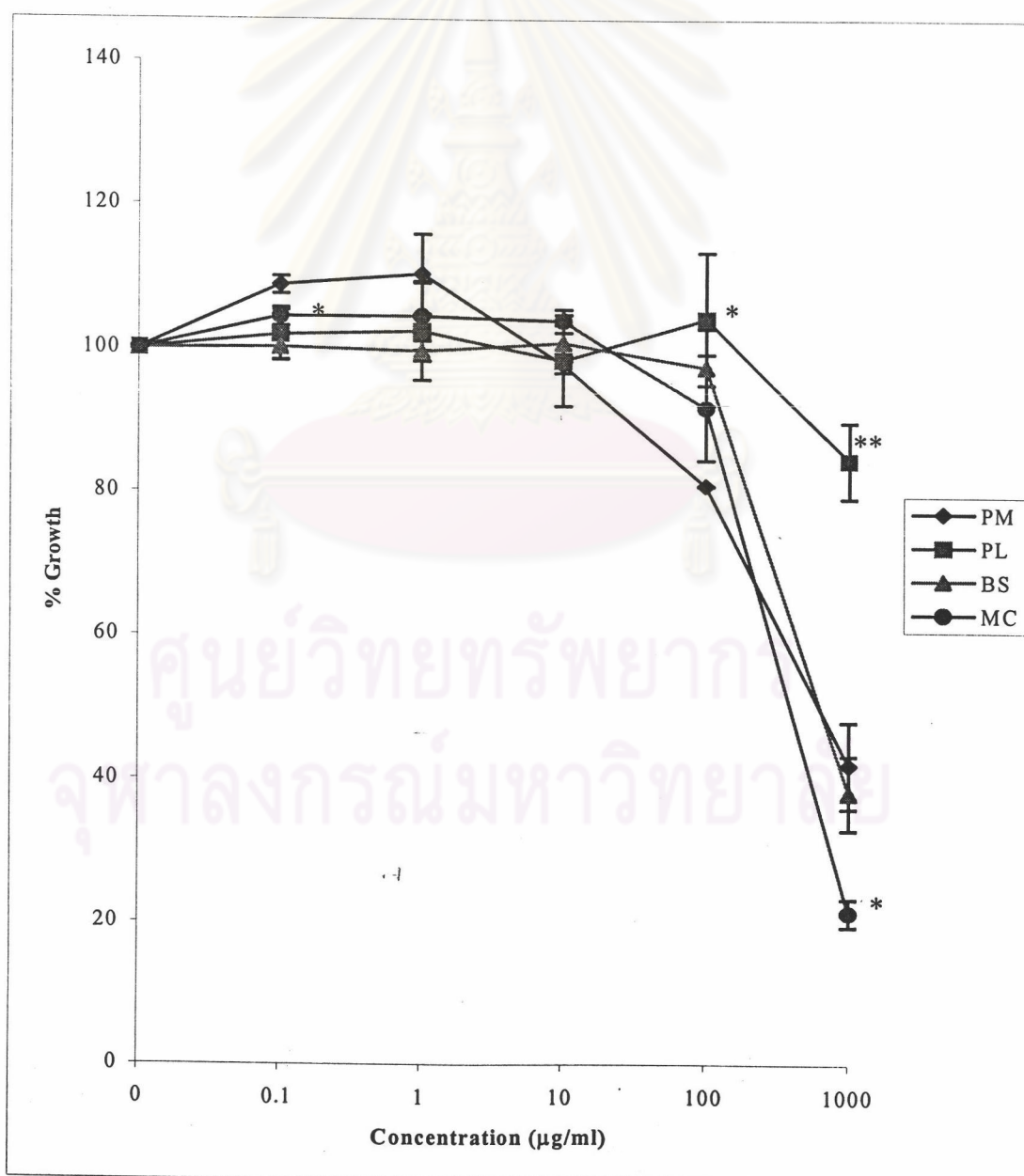


**Table 18.** Comparative dose response of *P. mirifica*, with *P. lobata*, *B. superba* and *M. collettii* extracts to HeLa cell culture at D<sub>4</sub> of experiment.

(MEAN ± SE, \* p ≤ 0.05, \*\* p ≤ 0.01)

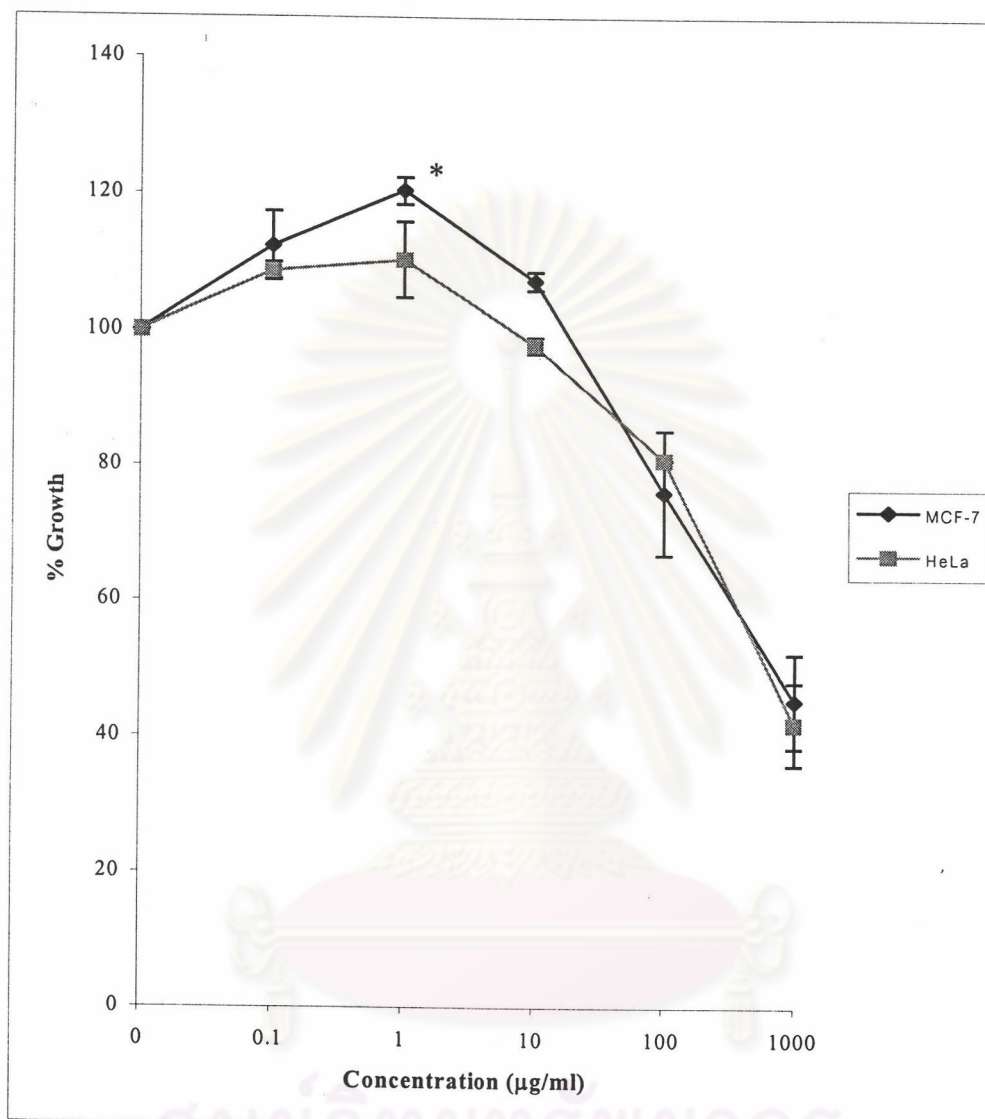
Species	Concentration (µg/ml)				
	0.1	1	10	100	1000
<i>P. mirifica</i>	108.73 ± 1.19	110.94 ± 5.55	97.94 ± 1.78	80.95 ± 0.005	42.01 ± 6.05
<i>P. lobata</i>	101.83 ± 3.46	102.47 ± 6.82	98.47 ± 6.31	104.27 ± 9.22*	84.45 ± 5.37**
<i>B. superba</i>	100.14 ± 1.87*	99.73 ± 1.40	100.90 ± 2.47	97.57 ± 5.33	38.15 ± 5.18
<i>M. collettii</i>	104.37 ± 1.31	104.46 ± 4.69	103.93 ± 7.39	91.90 ± 7.39	21.29 ± 2.01*

**Figure 15.** Comparative dose response of *P. mirifica* (PM), *P. lobata* (PL), *B. superba* (BS) and *M. collettii* (MC) extract on the growth of HeLa cell culture (MEAN ± SE; \* p < 0.05, \*\* p < 0.01)



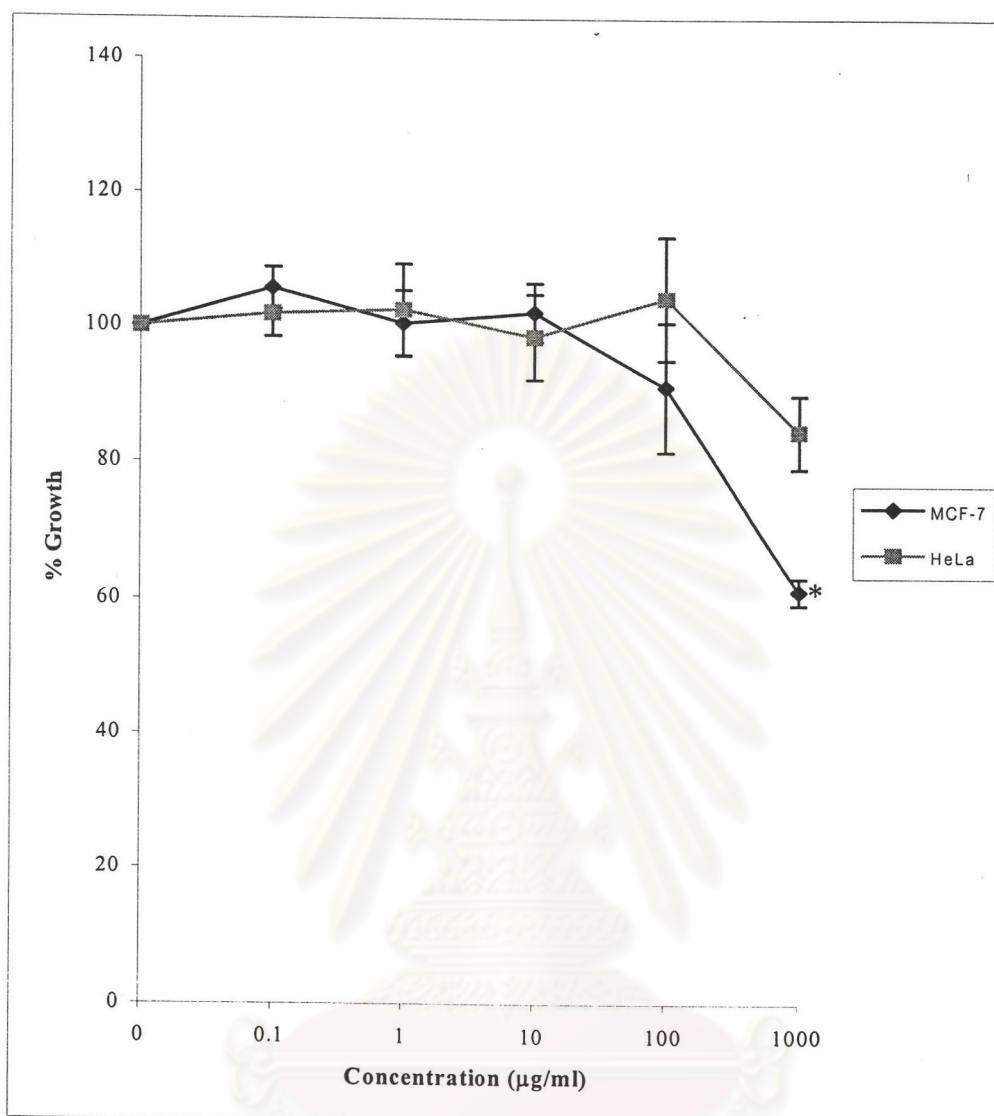
### 2.3 The effects of the plant extract on MCF-7 and HeLa cells

**Figure 16.** The effect of *P. mirifica* extract on the growth of MCF-7 and HeLa cells



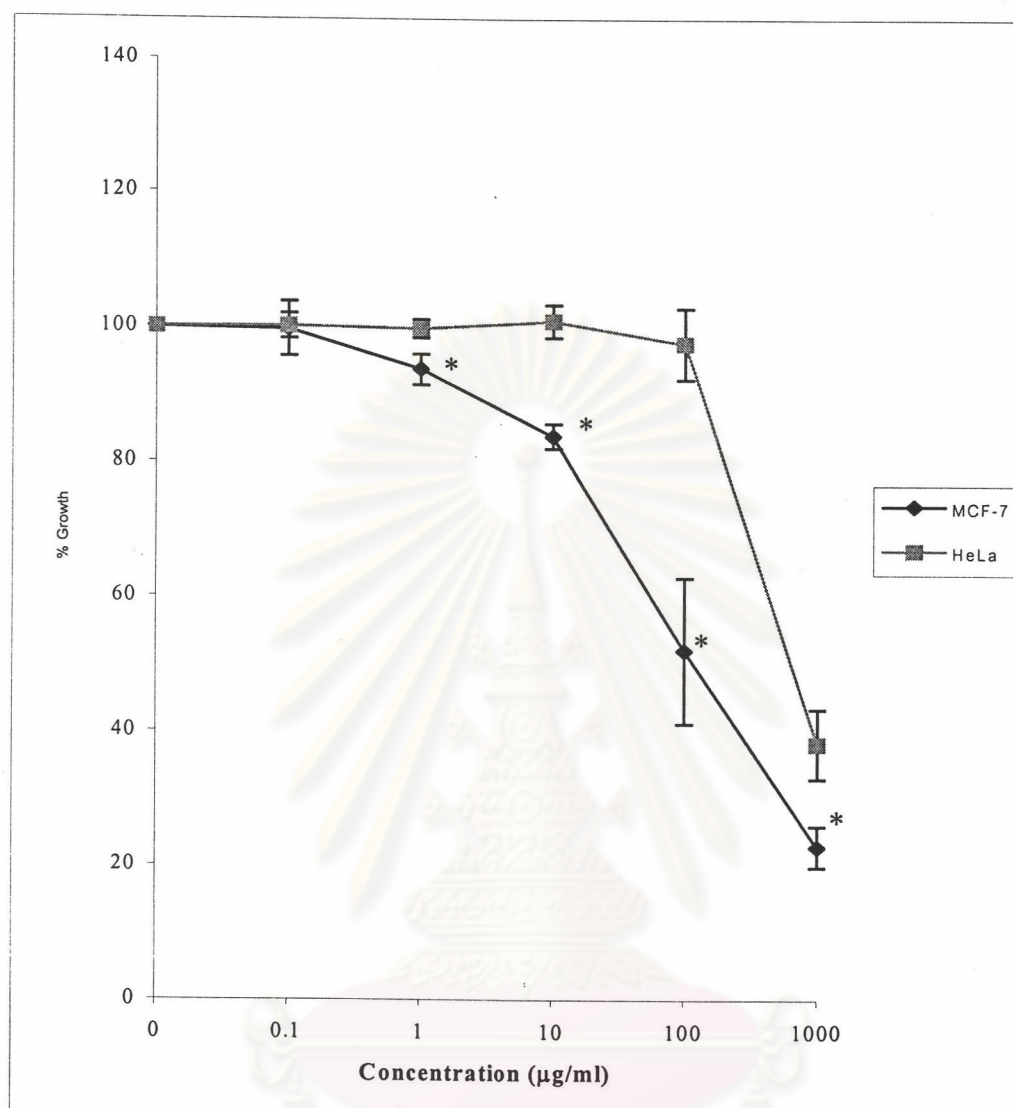
From **Figure 16** and result 2.1.2, 2.2.2, *P. mirifica* showed significant ( $p < 0.05$ ) proliferative effect on MCF-7 (ER<sup>+</sup>) at the concentration of 1 µg/ml as compared with HeLa cell (ER<sup>-</sup>) whereas the anti-proliferative effect was shown in both cell lines (ER<sup>+</sup> and ER<sup>-</sup>).

Figure 17. The effect of *P. lobata* extract on the growth of MCF-7 and HeLa cells



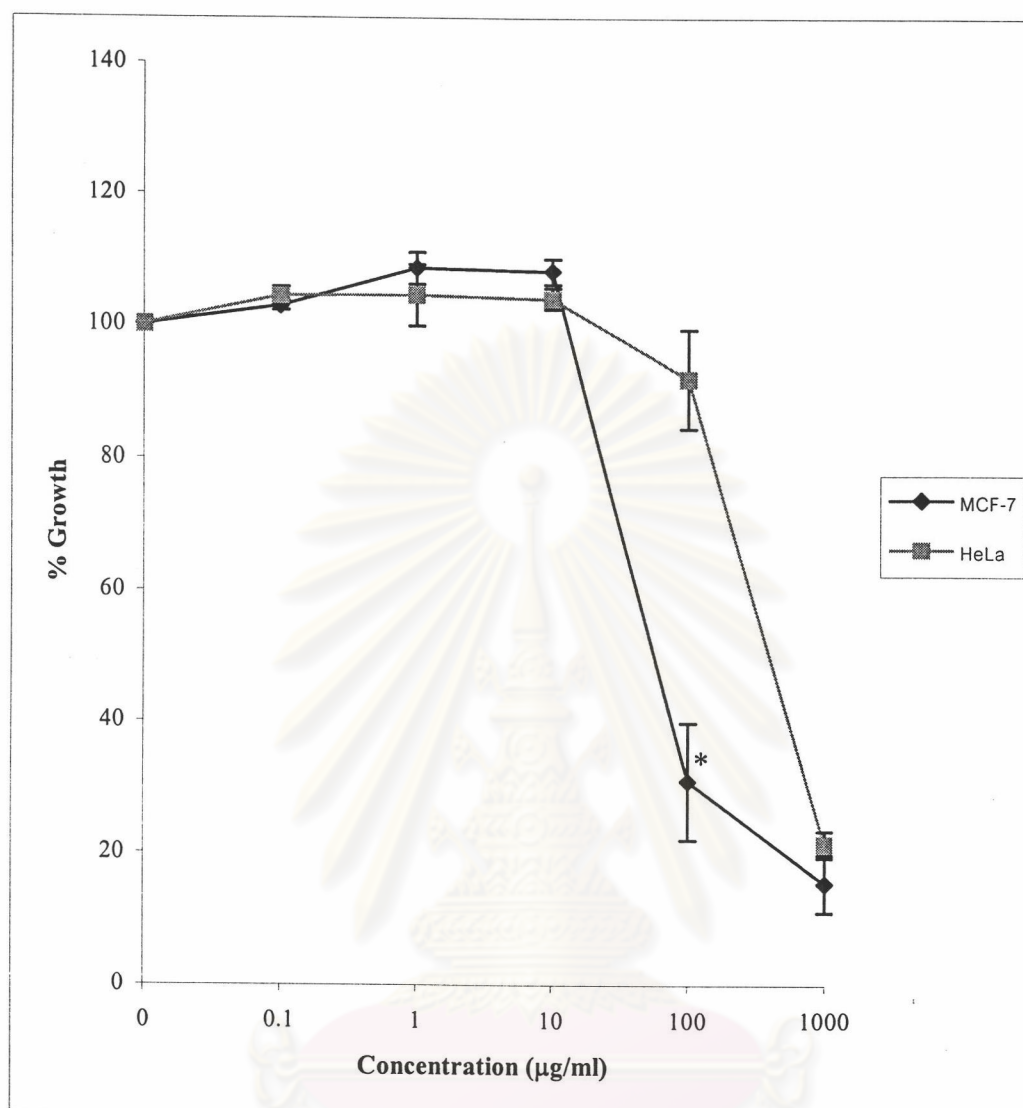
From Figure 17 and result 2.1.3, 2.2.3, *P. lobata* showed no proliferative effect on both MCF-7 (ER<sup>+</sup>) and HeLa cell (ER<sup>-</sup>). At the concentration of 1000 µg/ml, the anti-proliferative effect on MCF-7 was significant ( $p < 0.05$ ) as compared with HeLa cell.

**Figure 18.** The effect of *B. superba* extract on the growth of MCF-7 and HeLa cells



From **Figure 18** and result 2.1.4, 2.2.4, *B. superba* showed no proliferative effect on both MCF-7 (ER<sup>+</sup>) and HeLa cell (ER<sup>-</sup>). The antiproliferative effect was showed in both cell lines (ER<sup>+</sup> and ER<sup>-</sup>). At the concentration of 1, 10, 100, 10000 µg/ml, the antiproliferative effect on MCF-7 cell line was significant ( $p < 0.05$ ) as compared with HeLa cell.

**Figure 19.** The effect of *M. collettii* extract on the growth of MCF-7 and HeLa cells



From **Figure 19** and result 2.1.5, 2.2.5, *M. collettii* showed no proliferative effect on both MCF-7 (ER<sup>+</sup>) and HeLa cell (ER<sup>-</sup>). At the concentration of 100 µg/ml, the anti-proliferative effect on MCF-7 was significant as compared with HeLa cell.

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### 3 The effects of the plant extracts in the presence of estradiol

#### 3.1 MCF-7

From the results of 2.1.5, the concentration of  $10^{-11}$  M of estradiol was Chosen to combine with the plant extract.

##### 3.1.2 *P. mirifica*

The combination of  $10^{-11}$  M estradiol with *P. mirifica* extract shows non-significant decrement of cellular proliferation at low concentration (1  $\mu$ g/ml) but shows significant ( $p < 0.05$ ) increment of cellular anti-proliferative effect at high concentration (1000  $\mu$ g/ml) as compared with the extract-treated cells. The cell treated with the extract at high concentration and estradiol showed significantly antiproliferative effect ( $p < 0.01$ ) compared with the cells treated with estradiol only. (Table 19, Table 23, Figure 20 and Figure 24)

##### 3.1.2 *P. lobata*

The combination of  $10^{-11}$  M estradiol with *P. lobata* extract shows non-significant effect on cellular proliferation at both low (1  $\mu$ g/ml) and high (1000  $\mu$ g/ml) concentrations as compared with the extract-treated cells. The cell treated with the extract at high concentration and estradiol showed significantly antiproliferative effect ( $p < 0.01$ ) compared with the cell treated with estradiol only. (Table 20, Table 23, Figure 21 and Figure 25)

##### 3.1.3 *B. superba*

The combination of  $10^{-11}$  M estradiol with *B. superba* extract shows non-significant effect on cellular proliferation at both low (10  $\mu$ g/ml) and high (1000  $\mu$ g/ml) concentrations as compared with the cell treated with the extract only. The cell treated with the extract at high concentration and estradiol showed

significantly antiproliferative effect ( $p < 0.01$ ) as compared with the cell that treated with estradiol only. (Table 21, Table 23, Figure 22 and Figure 26)

### 3.1.4 *M. collettii*

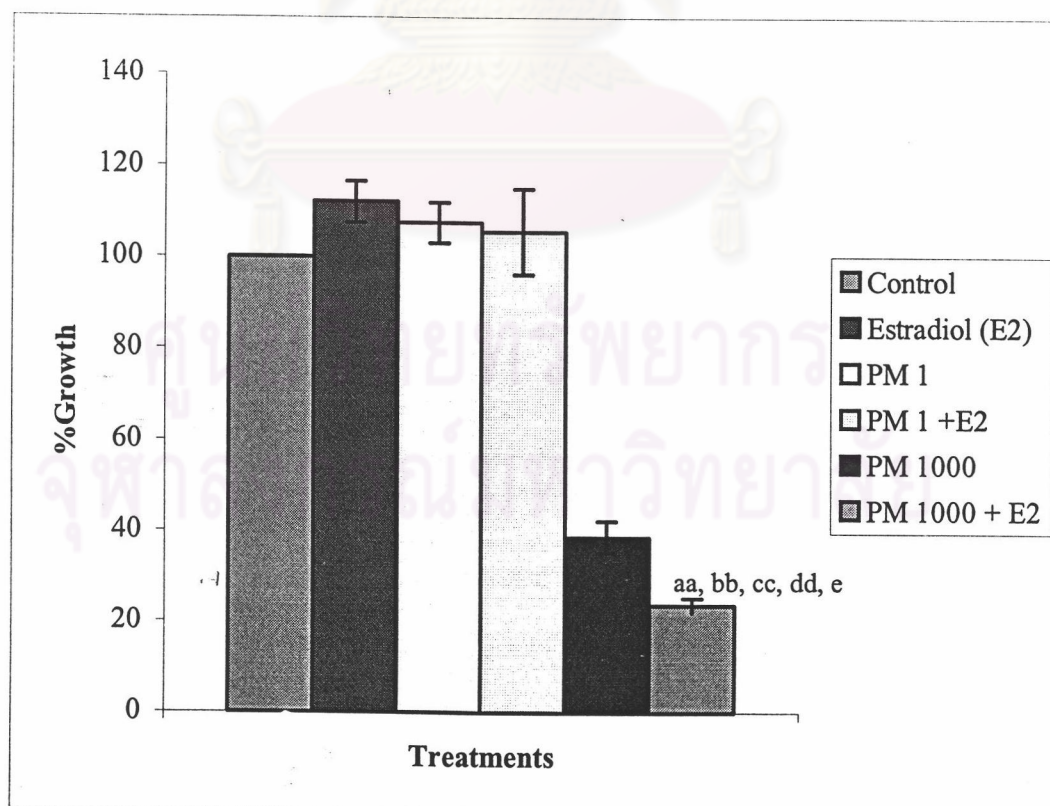
The combination of  $10^{-11}$  M estradiol with *M. collettii* extract shows non-significant increment of cellular proliferation at low concentration (10  $\mu\text{g/ml}$ ) but show significant ( $p < 0.01$ ) increment of cellular anti-proliferative at high concentration (1000  $\mu\text{g/ml}$ ) as compared with the extract-treated cells. The cell treated with the extract at high concentration and estradiol showed significantly antiproliferative effect ( $p < 0.01$ ) as compared with the cell that treated with estradiol only. (Table 22, Table 23, Figure 23 and Figure 27)



**Table 19.** The growth response percentage of MCF-7 cell culture on *P. mirifica* extract and  $10^{-11}$  M Estradiol. (E2 = Estradiol, PM = *P.mirifica*)

Concentration ( $\mu\text{g/ml}$ )	Exp. 1	Exp. 2	Exp.3	Mean	SE
Control	100	100	100	100	0
Estradiol (E2)	115.12	117.9	103.18	112.0667	4.5152
PM 1	107	100	115.42	107.4733	4.4577
PM 1 +E2	108.58	87.93	120.03	105.5133	9.3882
PM 1000	37.47	45.27	33.07	38.60333	3.5671
PM 1000 + E2	20.77	26.36	23.85	23.66	1.6165

**Figure 20.** The effect of *P. mirifica* extract on the growth of MCF-7 cell culture in the presence of Estradiol (MEAN  $\pm$  SE, <sup>aa</sup>  $p < 0.01$  compared with control group, <sup>bb</sup>  $p < 0.01$  compared with estradiol group, <sup>cc</sup>  $p < 0.01$  compared with low dose group, <sup>dd</sup>  $p < 0.01$  compared with low dose + E<sub>2</sub> group, <sup>e</sup>  $p < 0.05$  compared with high dose group, E2 = Estradiol, PM = *P.mirifica*)

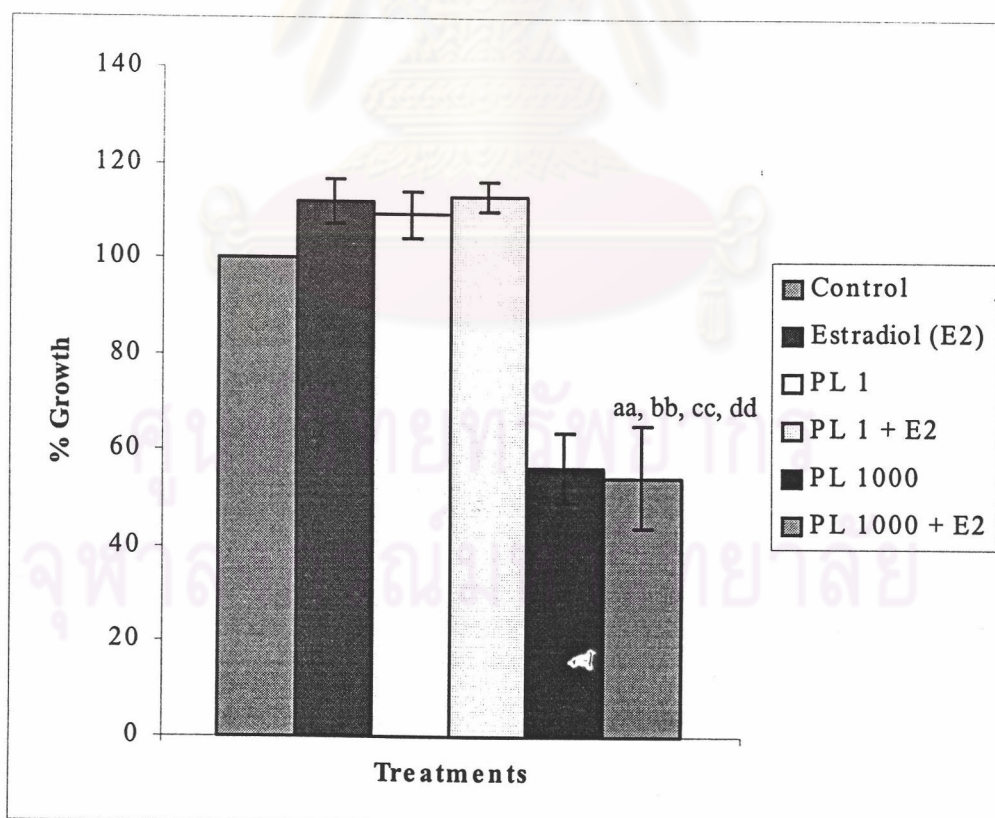




**Table 20.** The growth response percentage of MCF-7 cell culture on *P. lobata* extract and  $10^{-11}$  M Estradiol. (E2 = Estradiol, PL = *P.lobata*)

Concentration ( $\mu\text{g/ml}$ )	Exp. 1	Exp. 2	Exp. 3	Mean	SE
Control	100	100	100	100	0
Estradiol (E2)	115.12	117.9	103.18	112.0667	4.5152
PL 1	104.29	119.11	104.29	109.23	4.94
PL 1 + E2	119.19	110.87	108.74	112.9333	3.1882
PL 1000	62.08	65.79	42.29	56.72	7.2941
PL 1000 + E2	72.46	55.94	35.61	54.67	10.6566

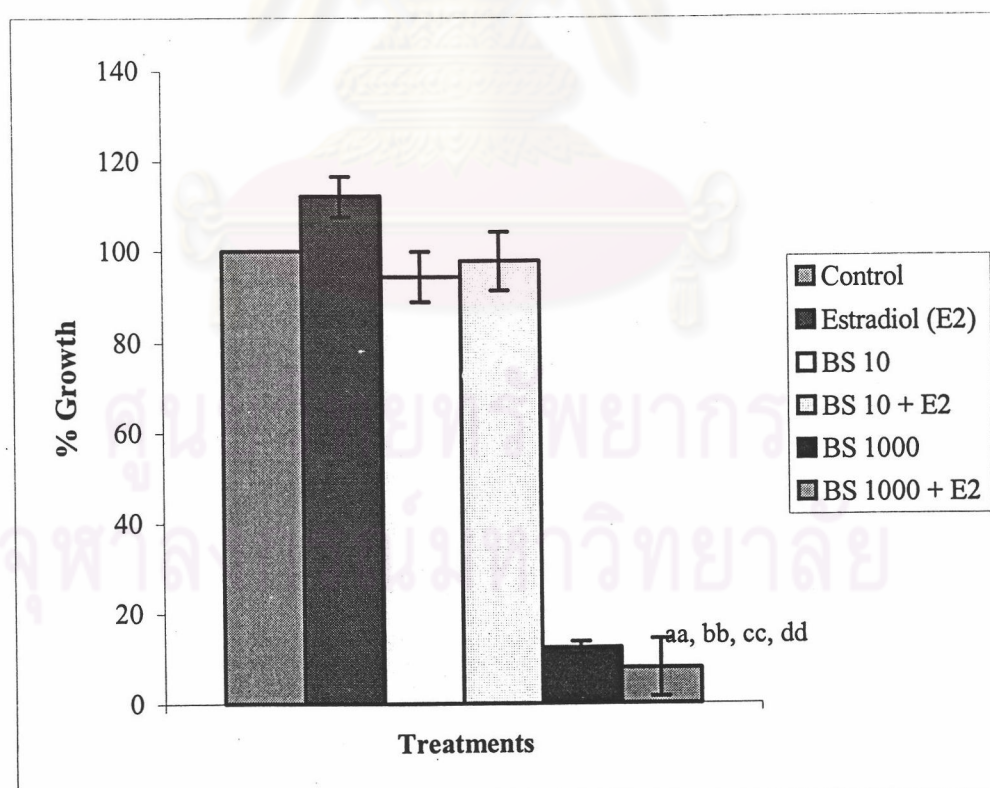
**Figure 21.** The effect of *P. lobata* extract on the growth of MCF-7 cell culture in the presence of Estradiol (MEAN  $\pm$  SE, <sup>aa</sup>  $p < 0.01$  compared with control group, <sup>bb</sup>  $p < 0.01$  compared with estradiol group, <sup>cc</sup>  $p < 0.01$  compared with low dose group, <sup>dd</sup>  $p < 0.01$  compared with low dose + E<sub>2</sub> group, E2 = Estradiol, PL = *P.lobata*)



**Table 21.** The growth response percentage of MCF-7 cell culture on *B.superba* extract and  $10^{-11}$  M Estradiol. (E2 = Estradiol, BS = *B. superba*)

Concentration ( $\mu\text{g/ml}$ )	Exp. 1	Exp. 2	Exp. 3	Mean	SE
Control	100	100	100	100	0
Estradiol (E2)	115.12	117.9	103.18	112.0667	4.5152
BS 10	81.77	103.02	98.41	94.4	5.5179
BS 10 + E2	87.5	96.38	109.38	97.75333	6.4209
BS 1000	16.927	7.85	12.56	12.44567	1.3957
BS 1000 + E2	13.021	6.24	4.61	7.957	6.409

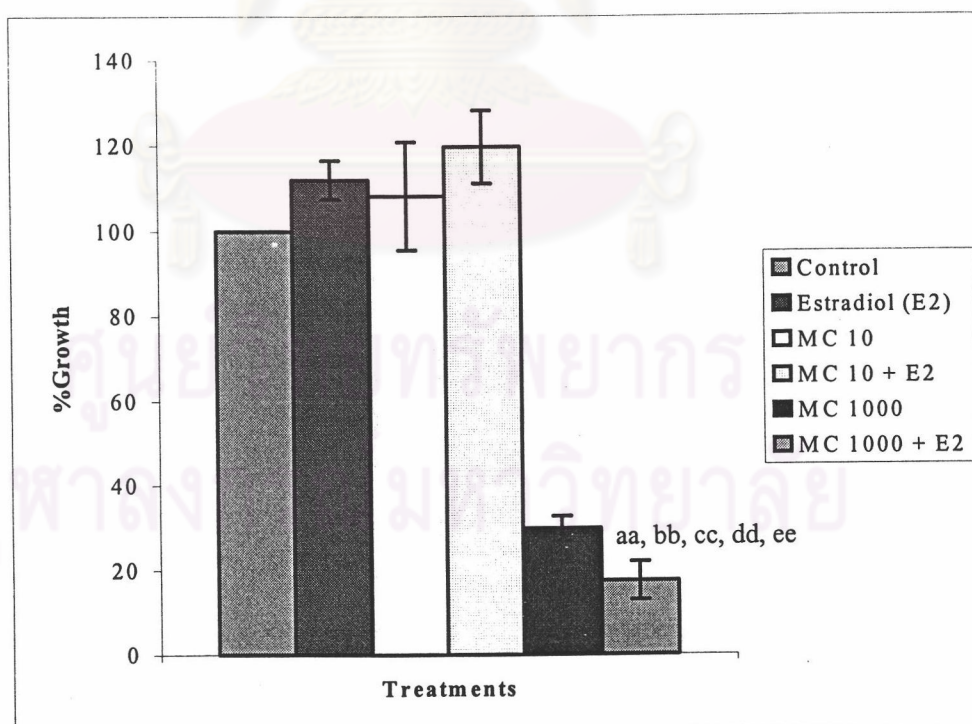
**Figure 22.** The effect of *B. superba* extract on the growth of MCF-7 cell culture in the presence of Estradiol (MEAN  $\pm$  SE, <sup>aa</sup>  $p < 0.01$  compared with control group, <sup>bb</sup>  $p < 0.01$  compared with estradiol group, <sup>cc</sup>  $p < 0.01$  compared with low dose group, <sup>dd</sup>  $p < 0.01$  compared with low dose + E<sub>2</sub> group, E2 = Estradiol, BS = *B. superba*)



**Table 22.** The growth response percentage of MCF-7 cell culture on *M. collettii* extract and  $10^{-11}$  M Estradiol. (E2 = Estradiol, MC = *M. collettii*)

Concentration ( $\mu\text{g/ml}$ )	Exp. 1	Exp. 2	Exp. 3	Mean	SE
Control	100	100	100	100	0
Estradiol (E2)	115.12	117.9	103.18	112.0667	4.5152
MC 10	130.7	86.72	107.31	108.2433	12.7045
MC 10 + E2	120.54	134.21	104.45	119.7333	8.6004
MC 1000	33.86	31.19	24.17	29.74	2.8897
MC 1000 + E2	25.77	16.5	10.17	17.48	4.5299

**Figure 23.** The effect of *M. collettii* extract on the growth of MCF-7 cell culture in the presence of Estradiol (MEAN  $\pm$  SE, <sup>aa</sup>  $p < 0.01$  compared with control group, <sup>bb</sup>  $p < 0.01$  compared with estradiol group, <sup>cc</sup>  $p < 0.01$  compared with low dose group, <sup>dd</sup>  $p < 0.01$  compared with low dose + E<sub>2</sub> group, <sup>ee</sup>  $p < 0.01$  compared with high dose group, E2 = Estradiol, MC = *M. collettii*)



**Table 23.** The comparison of the effect of the plant extracts upon MCF-7 culture in the presence and absence of estradiol

	Control	Estradiol (E <sub>2</sub> )	Low dose	Low dose + E <sub>2</sub>	High dose	High dose + E <sub>2</sub>
<i>P. mirifica</i>	100.00 ± 0.00	112.07 ± 7.82	107.47 ± 4.46	105.51 ± 9.39	38.60 ± 3.57 <sup>aa, bb, cc, dd</sup>	23.66 ± 1.62 <sup>aa, bb, cc, dd, e</sup>
<i>P. lobata</i>	100.00 ± 0.00	112.07 ± 7.82	109.23 ± 4.94	112.93 ± 3.19	56.72 ± 7.29 <sup>aa, bb, cc, dd</sup>	54.67 ± 10.66 <sup>aa, bb, cc, dd</sup>
<i>B. superba</i>	100.00 ± 0.00	112.07 ± 7.82	94.40 ± 6.45 <sup>b</sup>	97.75 ± 6.35 <sup>b</sup>	12.45 ± 2.62 <sup>aa, bb, cc, dd</sup>	7.96 ± 2.58 <sup>aa, bb, cc, dd</sup>
<i>M. collettii</i>	100.00 ± 0.00	112.07 ± 7.82	108.24 ± 12.70	119.73 ± 8.60	29.74 ± 2.89 <sup>aa, bb, cc, dd</sup>	17.84 ± 4.53 <sup>aa, bb, cc, dd, ee</sup>

<sup>aa</sup> p < 0.01 compared with control group

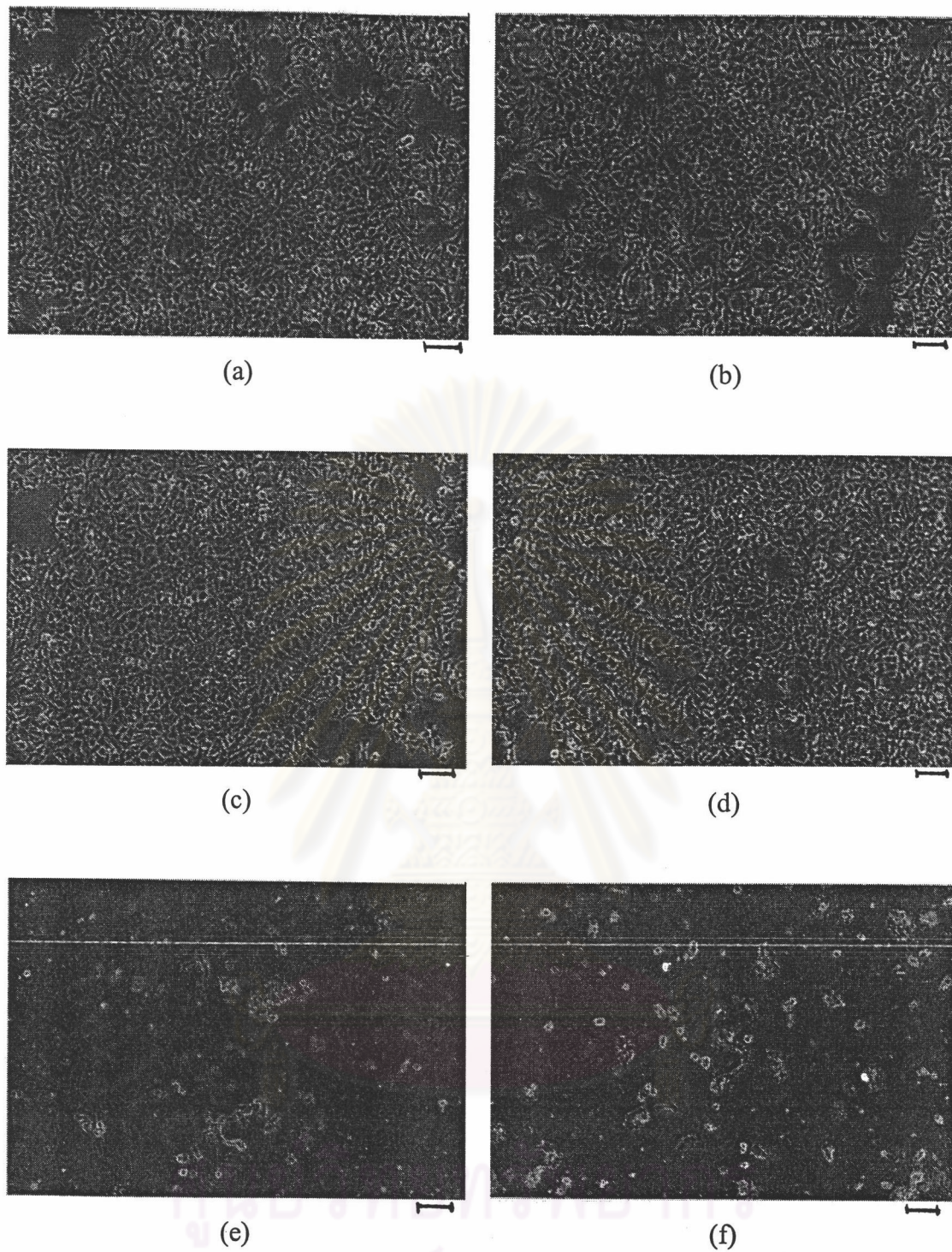
<sup>bb</sup> p < 0.01 compared with estradiol group

<sup>cc</sup> p < 0.01 compared with low dose group

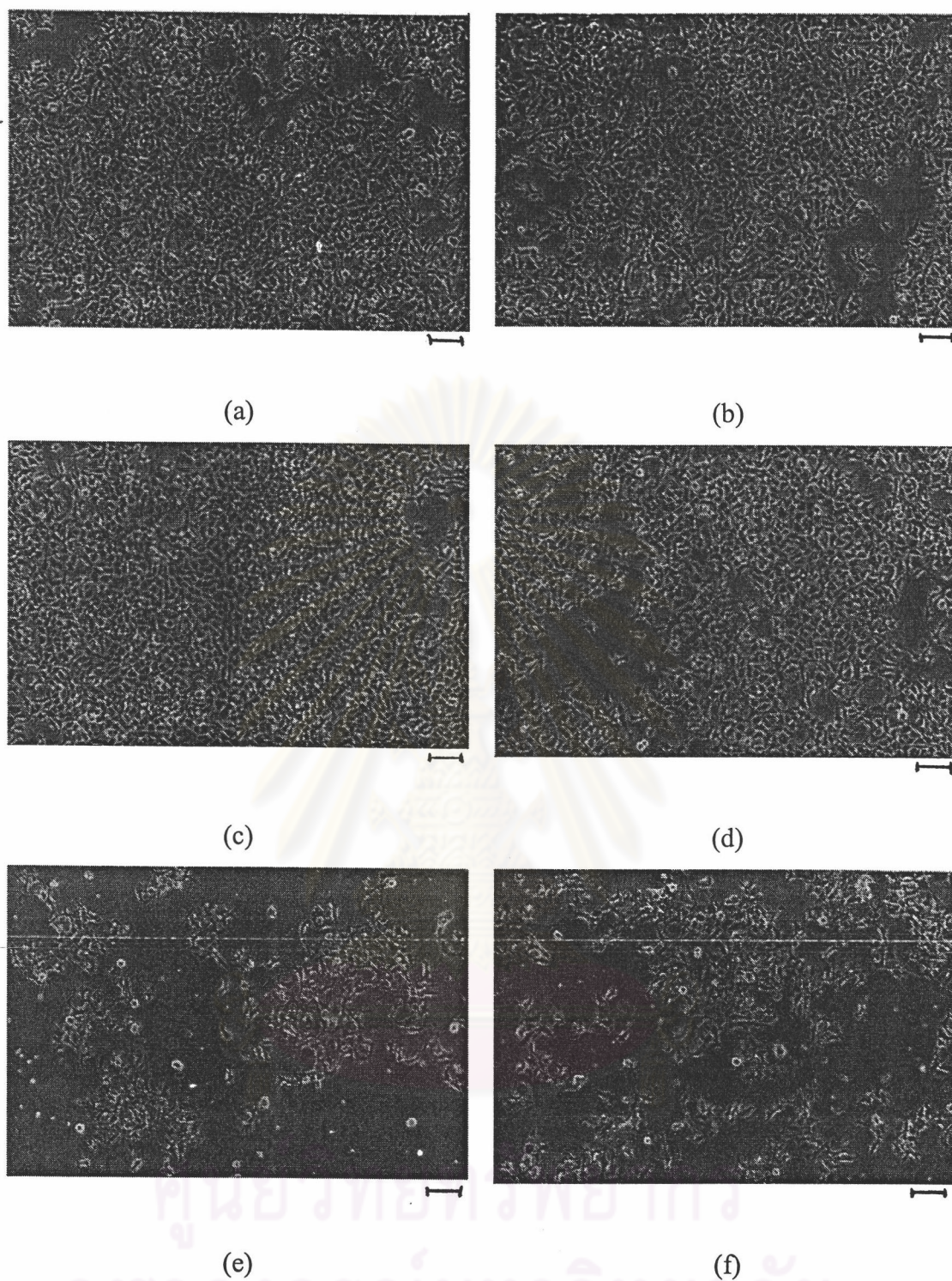
<sup>dd</sup> p < 0.01 compared with low dose + E<sub>2</sub> group

<sup>e</sup> p < 0.05, <sup>ee</sup> p < 0.01 compared with high dose group

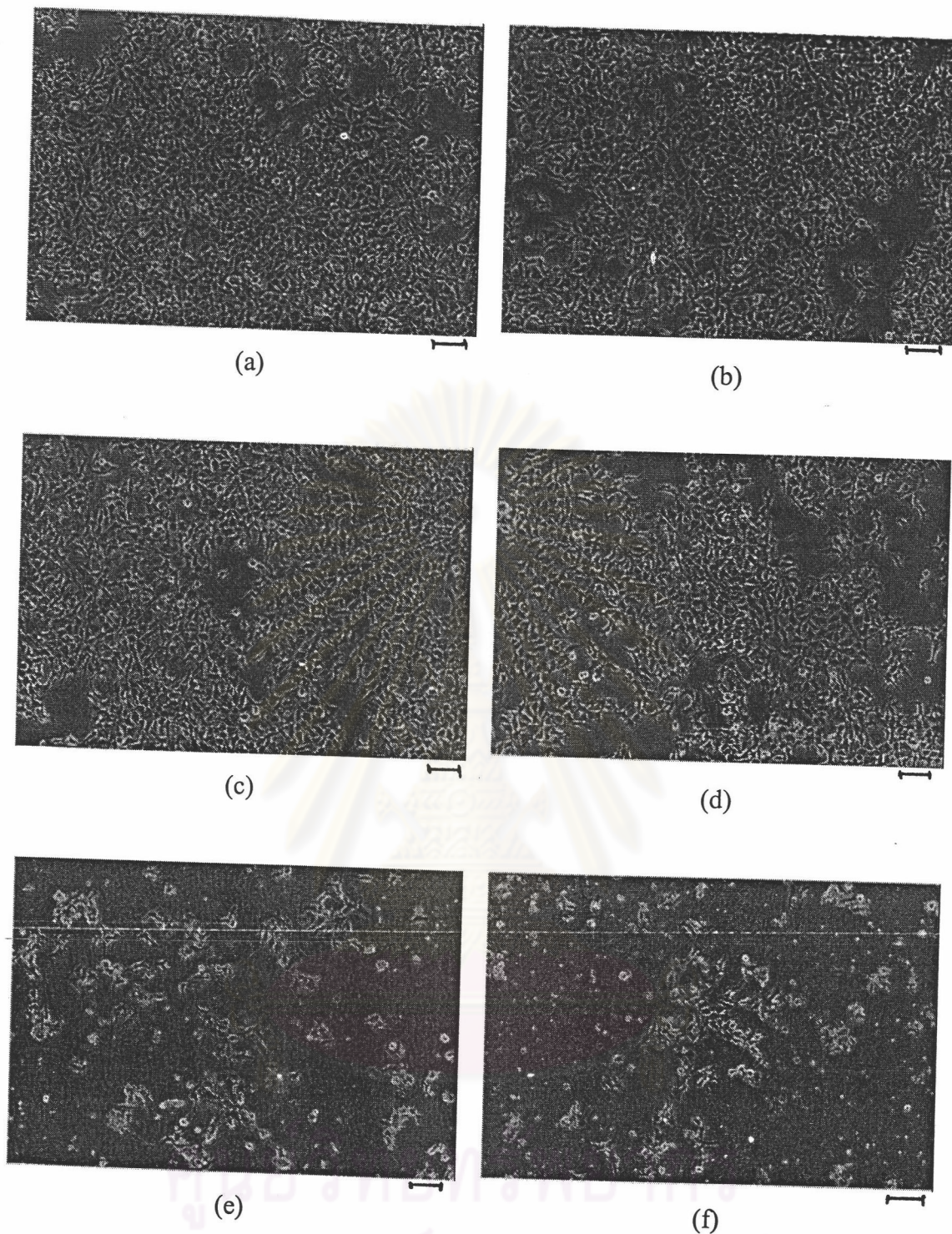
ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



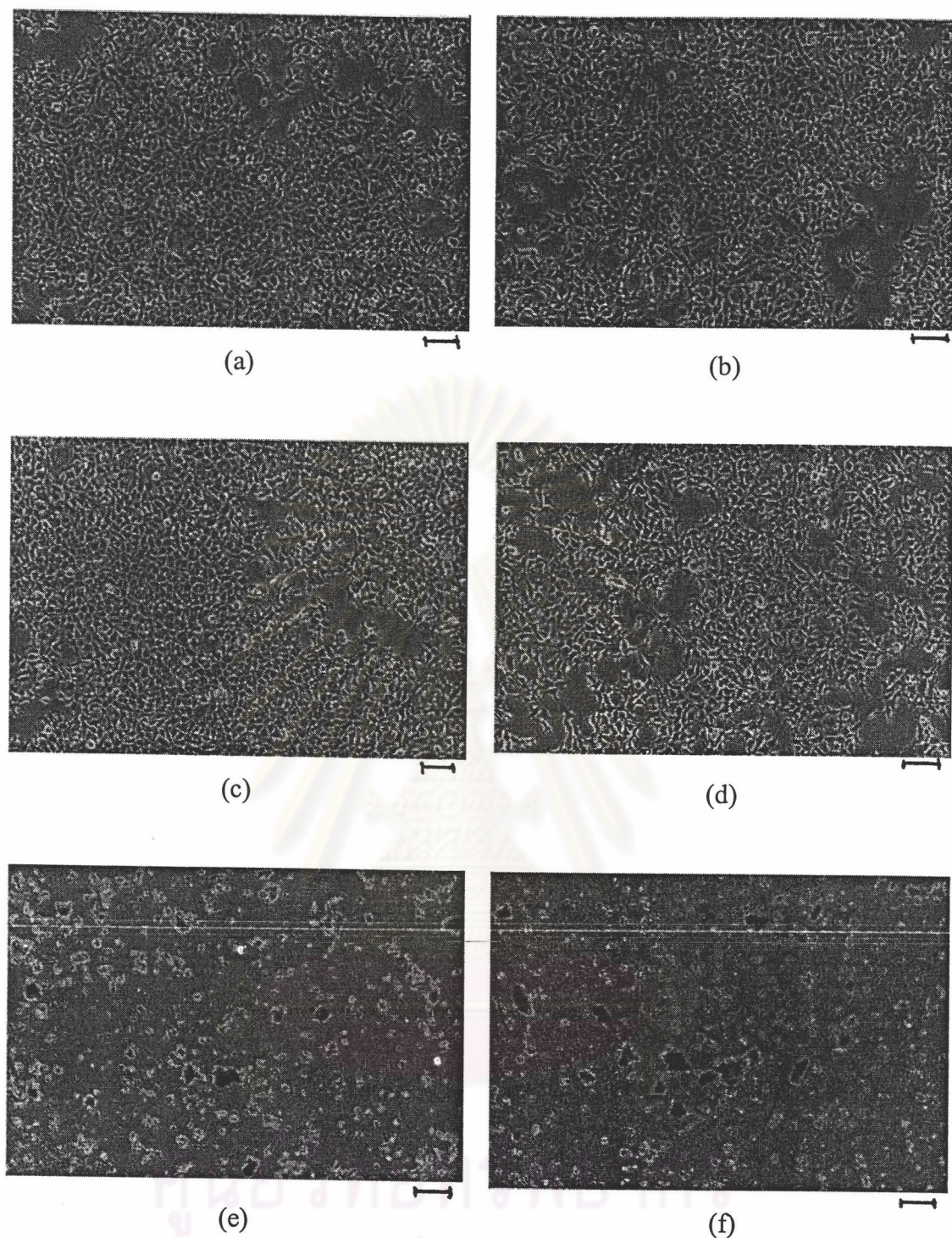
**Figure 24.** Morphology of the culture of MCF-7 cell line treated with *P.mirifica* and Estradiol at D<sub>4</sub> (a) Non-treated (b) 10<sup>-11</sup>M Estradiol (c) 1 µg/ml *P. mirifica* extract (d) 1 µg/ml *P. mirifica* extract and 10<sup>-11</sup>M Estradiol (e) 1000 µg/ml *P. mirifica* extract (f) 1000 µg/ml *P. mirifica* extract and 10<sup>-11</sup>M Estradiol. (Scale bar = 0.1 mm)



**Figure 25.** Morphology of the culture of MCF-7 cell line treated with *P.lobata* and Estradiol at D<sub>4</sub> (a) Non-treated (b)  $10^{-11}$ M Estradiol (c)  $1 \mu\text{g/ml}$  *P. lobata* extract (d)  $1 \mu\text{g/ml}$  *P. lobata* extract and  $10^{-11}$ M Estradiol (e)  $1000 \mu\text{g/ml}$  *P. lobata* extract (f)  $1000 \mu\text{g/ml}$  *P. lobata* extract and  $10^{-11}$ M Estradiol. (Scale bar = 0.1 mm)



**Figure 26** Morphology of the culture of MCF-7 cell line treated with *B. superba* and Estradiol at D<sub>4</sub> (a) Non-treated (b)  $10^{-11}$ M Estradiol (c)  $10 \mu\text{g/ml}$  *B. superba* extract (d)  $10 \mu\text{g/ml}$  *B. superba* extract and  $10^{-11}$ M Estradiol (e)  $1000 \mu\text{g/ml}$  *B. superba* extract (f)  $1000 \mu\text{g/ml}$  *B. superba* extract and  $10^{-11}$ M Estradiol. (Scale bar = 0.1 mm)



**Figure 37.** Morphology of the culture of MCF-7 cell line treated with *M. collettii* and Estradiol at D<sub>4</sub> (a) Non-treated (b)  $10^{-11}$ M Estradiol (c) 10 µg/ml *M. collettii* extract (d) 10 µg/ml *M. collettii* extract and  $10^{-11}$ M Estradiol (e) 1000 µg/ml *M. collettii* extract (f) 1000 µg/ml *M. collettii* extract and  $10^{-11}$ M Estradiol. (Scale bar = 0.1 mm)