

## LAMPIRAN

### Lampiran 1. Lokasi pengambilan sampel tanah



LG 9. Lokasi pengambilan sampel tanah di Hutan Universitas Brawijaya

### Lampiran 2. Komposisi media SCA (*Starch Casein Agar*)

#### LT 5. Komposisi medium pertumbuhan

<b>Bahan</b>	<b>Jumlah /1 liter</b>
Pati	10 gram
Casein Hydrosylate	0,3 gram
KNO <sub>3</sub>	2,0 gram
NaCl	2,0 gram
K <sub>2</sub> HPO <sub>4</sub>	2,0 gram
MgSO <sub>4</sub> .7H <sub>2</sub> O	0,05 gram
FeSO <sub>4</sub> .7H <sub>2</sub> O	0,01 gram
Agar	18,0 gram

### Lampiran 3. Analisa Kemampuan Penghasil Antibiotik



a



b



c



d



e



f

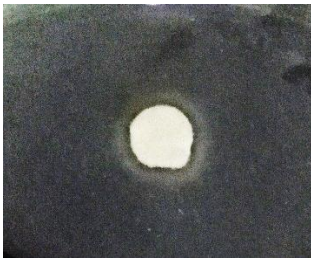


g



h

LG 10. Hasil Skrining dan Uji Potensi: a.ACT1.1 (*E.coli*), b. ACT1.2 (*E.coli*), c. ACT1.3 (*E.coli*), d. ACT1.4 (*E.coli*), e. ACT1.4 (MRSA), f. ACT1.5 (MRSA), g. ACT1.5 (*E.coli*), h. ACT1.6 (*E.coli*).



a



b



c



d



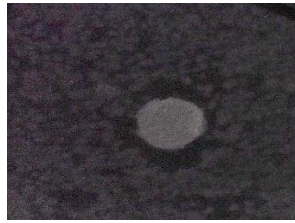
e



f



g



h

LG 11. Hasil Skrining dan Uji Potensi: a. ACT1.6 (*S.aureus*),  
b. ACT1.6 (MRSA), c. ACT2.1 (*S.aureus*),  
d. ACT2.1 (MRSA), e. ACT2.2 (MRSA), f. ACT2.3  
(MRSA), g. ACT2.4 (*S.aureus*), h. ACT3.2 (*S.aureus*)



a



b



c



d

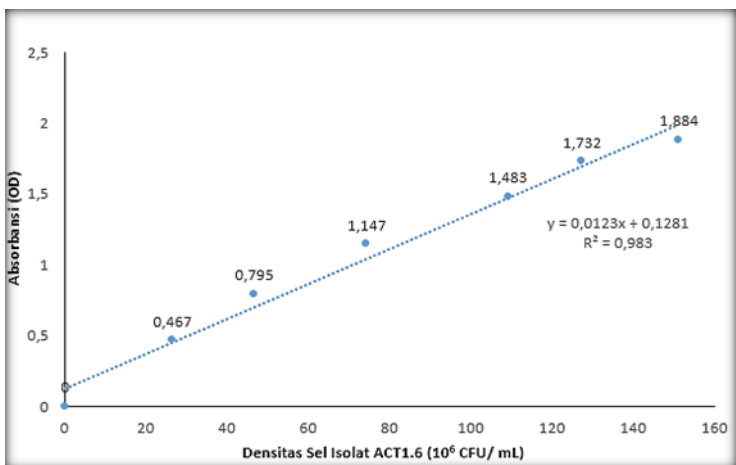


e

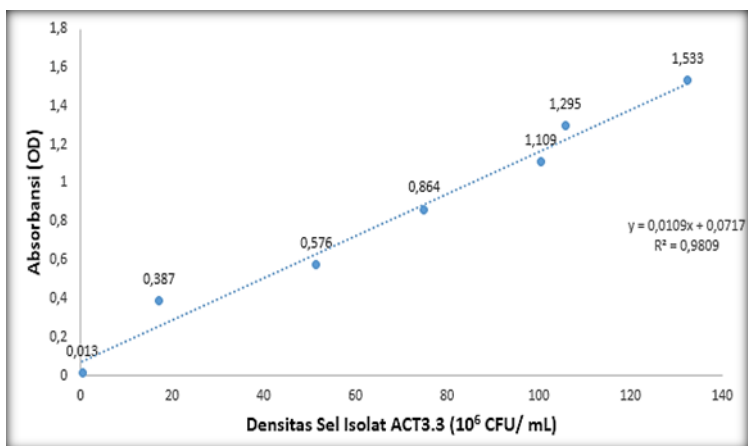


f

LG 12. Hasil Skrining dan Uji Potensi: a. ACT 3.3 (MRSA),  
b. ACT3.2 (*S.aureus*), c. ACT4.1 (*S.aureus*)  
d. ACT5.1 (*S.aureus*), e. ACT5.2 (*S.aureus*), f. ACT5.2  
(MRSA)

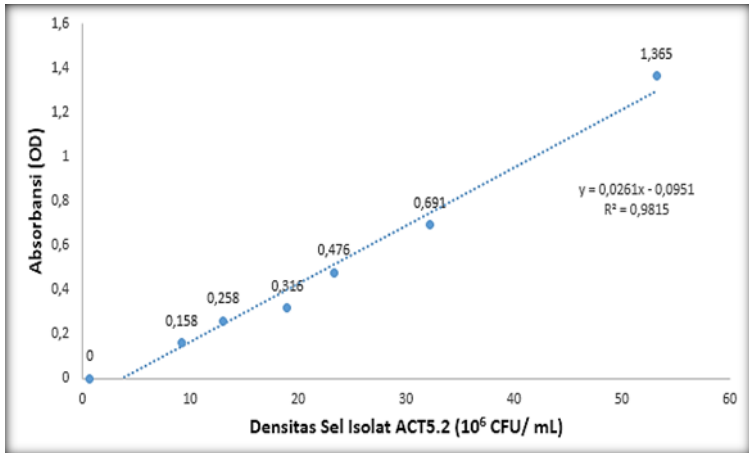


LG 13. Kurva standar isolat ACT1.6



LG 14. Kurva standar isolat ACT3.3





LG 15. Kurva standar isolat ACT5.2



a



b



c



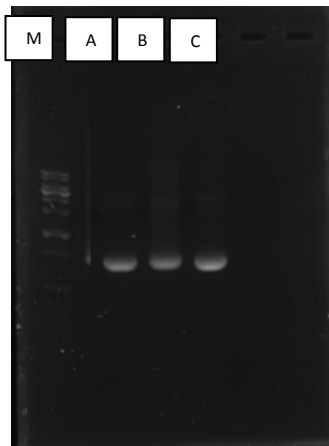
d

LG 16. Hasil *Extracellular metabolite*: a. ACT1.6 (EPEC),  
b. ACT1.6 (MRSA), c. ACT3.3 (EPEC), d. ACT3.3 (MRSA)



LG 17. Hasil *Extracellular metabolite*: ACT5.2 (MRSA)

#### Lampiran 4. Hasil PCR dan Matriks Nilai Similaritas *Actinomyces* Penghasil Antibiotik

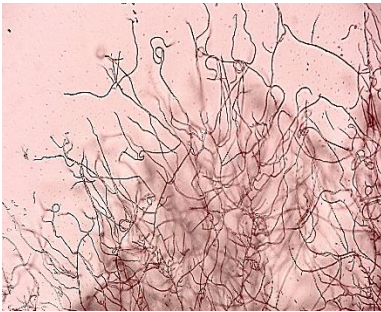


LG 18. Hasil PCR isolat *Actinomyces*: M (marker), A (Isolat ACT1.6), B (isolat ACT3.3), C (isolat ACT5.2)

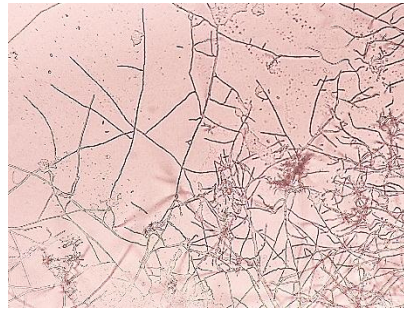
ACT5.2									
<i>Streptomyces clavuligerus</i> LCB69	99,99								
<i>Streptomyces clavuligerus</i> JCM 4710 <sup>T</sup>	99,78	99,79							
<i>Streptomyces clavuligerus</i> NBRC 13307 <sup>T</sup>	99,78	99,79	99,99						
<i>Corynebacterineae bacterium</i> CL1.15	99,96	99,96	99,79	99,79					
<i>Corynebacterineae bacterium</i> CL5.9	99,96	99,96	99,79	99,79	100,0				
<i>Mycobacterium gadium</i> MMA1020	99,99	100,00	99,79	99,78	99,96	99,96			
<i>Micrococcineae bacterium</i> BF.10	99,96	99,96	99,79	99,79	99,99	99,99	99,95		
<i>Micrococcineae bacterium</i> AM1	99,96	99,96	99,79	99,79	99,99	99,99	99,95	99,990	
<i>Streptomyces clavuligerus</i> MTCC 7037	99,94	99,95	99,79	99,79	99,95	99,95	99,94	99,94	99,94

LG 19. Nilai (%) Similaritas *Actinomycetes* Penghasil Antibiotik dengan Isolat Acuan

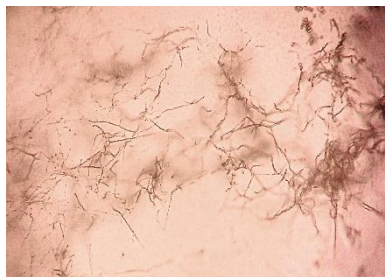
### Lampiran 5. Data Karakteristik Isolat *Actinomycetes*



a



b



c

LG 20. Bentuk morfologi spora 3 isolat *Actinomycetes* terpilih  
a. Isolat ACT5.2, b. Isolat ACT3.3, c. Isolat ACT1.6



Karakter	Isolat							
	ACT1.1	ACT1.2	ACT1.3	ACT1.4	ACT1.5	ACT1.6	ACT2.1	ACT2.2
<b>Substrate mycellium</b>								
kecoklatan	+	-	-	-	-	-	-	-
putih pudar	-	+	+	+	-	-	+	-
krem	-	-	-	-	+	+	-	-
putih	-	-	-	-	-	-	-	+
kuning	-	-	-	-	-	-	-	-
kuning pudar	-	-	-	-	-	-	-	-
<b>Aerial mycellium</b>								
kuning	+	-	-	-	-	-	-	-
putih	-	+	+	-	-	-	+	-
abu-abu	-	-	-	+	-	-	-	-
putih susu	-	-	-	-	+	+		+
orange pudar	-	-	-	-	-	-	-	-
kecoklatan	-	-	-	-	-	-	-	-
krem	-	-	-	-	-	-	-	-
orange	-	-	-	-	-	-	-	-
<b>Konsistensi (permukaan)</b>								
kering	+	+	+	+	-	+	+	-
lekit	-	-	-	-	+	-	-	+
licin	-	-	-	-	-	-	-	-
<b>Tekstur</b>								
berkontur	+	+	+	+	-	+	+	-
licin	-	-	-	-	+	-	-	+
<b>Bentuk Koloni</b>								
bulat	-	+	+	+	-	+	+	+
irregular	+	-	-	-	+	-	-	-
<b>Margin</b>								
erose	+	-	-	-	-	+	-	-
beralun	-	-	-	-	+	-	-	-
lobate	-	-	-	-	-	-	-	-
menyeluruh	-	+	+	+	-	-	+	+
<b>Elevasi</b>								
umbonat	+	-	+	-	-	-	+	-
cembung	-	+	-	+	-	-	-	-
pulvinat	-	-	-	-	+			+
datar	-	-	-	-	-	-	-	-

LG 21. Karakteristik koloni isolat *Actinomyces* ACT1.1, ACT1.2, ACT1.3, ACT1.4, ACT1.5, ACT1.6, ACT2.1, dan ACT2.2.

Karakter	Isolat							
	ACT2.3	ACT2.4	ACT3.1	ACT3.2	ACT3.3	ACT4.1	ACT5.1	ACT5.2
<b>Substrate mycellium</b>								
kecoklatan	-	-	-	-	-	-	-	-
putih pudar	-	-	-	-	+	-	-	-
krem	-	-	-	+	-	-	-	+
putih	-	-	+	-	-	+	+	-
kuning	+	-	-	-	-	-	-	-
kuning pudar	-	+	-	-	-	-	-	-
<b>Aerial mycellium</b>								
kuning	-	-	-	-	-	-	-	-
putih	-	-	+	-	-	+	+	-
abu-abu	-	-	-	-	-	-	-	-
putih susu	-	-	-	-	-	-	-	-
orange pudar	+	-	-	-	-	-	-	-
kecoklatan	-	+	-	-	-	-	-	-
krem	-	-	-	+	-	-	-	-
orange	-	-	-	-	+	-	-	+
<b>Konsistensi (permukaan)</b>								
kering	-	+	+	+	-	+	+	-
lekit	+	-	-	-	-	-	-	+
licin	-	-	-	-	+	-	-	-
<b>Tekstur</b>								
berkontur	-	+	+	+	+	+	-	-
licin	+	-	-	-	-	-	+	+
<b>Bentuk Koloni</b>								
bulat	+	-	+	-	+	+	+	+
irregular	-	+	-	+	-	-	-	-
<b>Margin</b>								
erose	-	-	-	-	-	-	-	-
beralun	-	+	-	-	-	-	-	-
lobate	-	-	-	+	-	-	-	-
menyeluruh	+	-	+	-	+	+	+	+
<b>Elevasi</b>								
umbonat	-	-	-	-	-	-	-	-
cembung	-	-	+	-	+	+	+	+
pulvinat	+	-	-	-	-	-	-	-
datar	-	+	-	+	-	-	-	-

LG 22. Karakteristik koloni isolat *Actinomycetes* ACT1.1, ACT1.2, ACT1.3, ACT1.4, ACT1.5, ACT1.6, ACT2.1, dan ACT2.2

## Lampiran 6. Uji Statistik *Actinomyces* Penghasil Antibiotik

### LT 6. Statistik Skrining dan Uji Potensi

#### One-Sample Kolmogorov-Smirnov Test

		isolat	patogen	Daya_hambat
N		144	144	144
Normal Parameters <sup>a</sup>	Mean	8.5000	2.0000	4.5144
	Std. Deviation	4.62586	.81935	5.42284
Most Extreme Differences	Absolute	.088	.222	.339
	Positive	.088	.222	.339
	Negative	-.088	-.222	-.203
Kolmogorov-Smirnov Z		1.054	2.666	4.069
Asymp. Sig. (2-tailed)		.216	.000	.000

a. Test distribution is Normal.

#### Descriptive Statistics

Dependent Variable:Daya\_hambat

isolat	patogen	Mean	Std. Deviation	N
ACT1.1	E.coli	7.6667	.57735	3
	S. aureus	.0000	.00000	3
	MRSA	.0000	.00000	3
	Total	2.5556	3.84419	9
ACT1.2	E.coli	9.2000	.34641	3
	S. aureus	.0000	.00000	3
	MRSA	.0000	.00000	3
	Total	3.0667	4.60326	9
ACT1.3	E.coli	9.7667	2.40069	3
	S. aureus	.0000	.00000	3
	MRSA	.0000	.00000	3
	Total	3.2556	5.02870	9
ACT1.4	E.coli	9.0667	2.33524	3

	S. aureus	.0000	.00000	3
	MRSA	6.2967	.87134	3
	Total	5.1211	4.21234	9
ACT1.5	E.coli	9.5000	1.01489	3
	S. aureus	.0000	.00000	3
	MRSA	6.6333	1.09697	3
	Total	5.3778	4.28567	9
ACT1.6	E.coli	11.0667	.50332	3
	S. aureus	6.1000	.17321	3
	MRSA	15.6633	3.03731	3
	Total	10.9433	4.41972	9
ACT2.1	E.coli	.0000	.00000	3
	S. aureus	13.1667	2.51462	3
	MRSA	7.3000	.88882	3
	Total	6.8222	5.86617	9
ACT2.2	E.coli	.0000	.00000	3
	S. aureus	.0000	.00000	3
	MRSA	5.9333	.76376	3
	Total	1.9778	2.99114	9
ACT2.3	E.coli	.0000	.00000	3
	S. aureus	.0000	.00000	3
	MRSA	6.3667	.20817	3
	Total	2.1222	3.18503	9
ACT2.4	E.coli	.0000	.00000	3
	S. aureus	9.8667	.23094	3
	MRSA	.0000	.00000	3
	Total	3.2889	4.93468	9
ACT3.1	E.coli	.0000	.00000	3
	S. aureus	.0000	.00000	3
	MRSA	.0000	.00000	3
	Total	.0000	.00000	9
ACT3.2	E.coli	.0000	.00000	3
	S. aureus	11.9333	1.72143	3
	MRSA	.0000	.00000	3

	Total	3.9778	6.02843	9
ACT3.3	E.coli	.0000	.00000	3
	S. aureus	8.4300	.60655	3
	MRSA	15.8333	.76376	3
	Total	8.0878	6.87815	9
ACT4.1	E.coli	.0000	.00000	3
	S. aureus	11.5000	1.82483	3
	MRSA	.0000	.00000	3
	Total	3.8333	5.82194	9
ACT5.1	E.coli	.0000	.00000	3
	S. aureus	11.7667	1.07858	3
	MRSA	.0000	.00000	3
	Total	3.9222	5.90800	9
ACT5.2	E.coli	.0000	.00000	3
	S. aureus	7.6000	2.27156	3
	MRSA	16.0333	.60277	3
	Total	7.8778	7.04446	9
Total	E.coli	3.5167	4.68925	48
	S. aureus	5.0227	5.41359	48
	MRSA	5.0038	6.05409	48
	Total	4.5144	5.42284	144

### Test of Homogeneity of Variances

Daya\_hambat

Levene Statistic	df1	df2	Sig.
8.220	47	96	.000

### ANOVA

Daya_hambat					
	Sum of Squares	df	Mean Square	F	Sig.



Between Groups	4113.442	47	87.520	91.533	.000
Within Groups	91.791	96	.956		
Total	4205.234	143			

LT 7. Statistik Daya Hambat *Extracellular Metabolite*

**One-Sample Kolmogorov-Smirnov Test**

		Isolat	Patogen	Daya_hambat
N		54	54	54
Normal Parameters <sup>a</sup>	Mean	2.0000	3.5000	1.8148
	Std. Deviation	.82416	1.72386	2.98780
Most Extreme Differences	Absolute	.221	.141	.450
	Positive	.221	.141	.450
	Negative	-.221	-.141	-.272
Kolmogorov-Smirnov Z		1.623	1.038	3.310
Asymp. Sig. (2-tailed)		.010	.232	.000

a. Test distribution is Normal.

**Descriptive Statistics**

Dependent Variable:Daya\_hambat

Isolat	Patogen	Interaksi	Mean	Std. Deviation	N
ACT1.6	E.coli	ACT1.6_E.coli	.0000	.00000	3
		Total	.0000	.00000	3
	EPEC	ACT1.6_EPEC	6.2000	.34641	3
		Total	6.2000	.34641	3
V.Cholerae		ACT1.6_V.cholerae	.0000	.00000	3
		Total	.0000	.00000	3

	S.aureus	ACT1.6_S.aureus	.0000	.00000	3
		Total	.0000	.00000	3
	S.epidermidis	ACT1.6_S.epidermidis	.0000	.00000	3
		Total	.0000	.00000	3
	MRSA	ACT1.6_MRSA	6.1000	.87178	3
		Total	6.1000	.87178	3
	Total	ACT1.6_E.coli	.0000	.00000	3
		ACT1.6_EPEC	6.2000	.34641	3
		ACT1.6_V.cholerae	.0000	.00000	3
		ACT1.6_S.aureus	.0000	.00000	3
		ACT1.6_S.epidermidis	.0000	.00000	3
		ACT1.6_MRSA	6.1000	.87178	3
		Total	2.0500	3.00064	18
ACT3.3	E.coli	ACT3.3_E.coli	.0000	.00000	3
		Total	.0000	.00000	3
	EPEC	ACT3.3_EPEC	6.8333	.32146	3
		Total	6.8333	.32146	3
	V.Cholerae	ACT3.3_V.cholerae	.0000	.00000	3
		Total	.0000	.00000	3
	S.aureus	ACT3.3_S.aureus	.0000	.00000	3
		Total	.0000	.00000	3
	S.epidermidis	ACT3.3_S.epidermidis	.0000	.00000	3
		Total	.0000	.00000	3
	MRSA	ACT3.3_MRSA	6.0333	.85049	3
		Total	6.0333	.85049	3
	Total	ACT3.3_E.coli	.0000	.00000	3
		ACT3.3_EPEC	6.8333	.32146	3
		ACT3.3_V.cholerae	.0000	.00000	3

		ACT3.3_S.aureus	.0000	.00000	3	
		ACT3.3_S.epidermidis	.0000	.00000	3	
		ACT3.3_MRSA	6.0333	.85049	3	
		Total	2.1444	3.14516	18	
ACT5.2	E.coli	ACT5.2_E.coli	.0000	.00000	3	
		Total	.0000	.00000	3	
	EPEC	ACT5.2_EPEC	.0000	.00000	3	
		Total	.0000	.00000	3	
	V.Cholerae	ACT5.2_V.cholerae	.0000	.00000	3	
		Total	.0000	.00000	3	
	S.aureus	ACT5.2_S.aureus	.0000	.00000	3	
		Total	.0000	.00000	3	
	S.epidermidis	ACT5.2_S.epidermidis	.0000	.00000	3	
		Total	.0000	.00000	3	
	MRSA	ACT5.2_MRSA	7.5000	1.13578	3	
		Total	7.5000	1.13578	3	
	Total		ACT5.2_E.coli	.0000	.00000	3
			ACT5.2_EPEC	.0000	.00000	3
ACT5.2_V.cholerae			.0000	.00000	3	
ACT5.2_S.aureus			.0000	.00000	3	
ACT5.2_S.epidermidis			.0000	.00000	3	
ACT5.2_MRSA			7.5000	1.13578	3	
	Total	1.2500	2.90238	18		
Total	E.coli	ACT1.6_E.coli	.0000	.00000	3	
		ACT3.3_E.coli	.0000	.00000	3	
		ACT5.2_E.coli	.0000	.00000	3	
		Total	.0000	.00000	9	
	EPEC	ACT1.6_EPEC	6.2000	.34641	3	
		ACT3.3_EPEC	6.8333	.32146	3	
		ACT5.2_EPEC	.0000	.00000	3	

	Total	4.3444	3.27838	9
V.Cholerae	ACT1.6_V.cholerae	.0000	.00000	3
	ACT3.3_V.cholerae	.0000	.00000	3
	ACT5.2_V.cholerae	.0000	.00000	3
	Total	.0000	.00000	9
S.aureus	ACT1.6_S.aureus	.0000	.00000	3
	ACT3.3_S.aureus	.0000	.00000	3
	ACT5.2_S.aureus	.0000	.00000	3
	Total	.0000	.00000	9
S.epidermidis	ACT1.6_S.epidermidis	.0000	.00000	3
	ACT3.3_S.epidermidis	.0000	.00000	3
	ACT5.2_S.epidermidis	.0000	.00000	3
	Total	.0000	.00000	9
MRSA	ACT1.6_MRSA	6.1000	.87178	3
	ACT3.3_MRSA	6.0333	.85049	3
	ACT5.2_MRSA	7.5000	1.13578	3
	Total	6.5444	1.09899	9
Total	ACT1.6_E.coli	.0000	.00000	3
	ACT1.6_EPEC	6.2000	.34641	3
	ACT1.6_V.cholerae	.0000	.00000	3
	ACT1.6_S.aureus	.0000	.00000	3
	ACT1.6_S.epidermidis	.0000	.00000	3
	ACT1.6_MRSA	6.1000	.87178	3
	ACT3.3_E.coli	.0000	.00000	3
	ACT3.3_EPEC	6.8333	.32146	3
	ACT3.3_V.cholerae	.0000	.00000	3
	ACT3.3_S.aureus	.0000	.00000	3

ACT3.3_S.epidermidis	.0000	.00000	3
ACT3.3_MRSA	6.0333	.85049	3
ACT5.2_E.coli	.0000	.00000	3
ACT5.2_EPEC	.0000	.00000	3
ACT5.2_V.cholerae	.0000	.00000	3
ACT5.2_S.aureus	.0000	.00000	3
ACT5.2_S.epidermidis	.0000	.00000	3
ACT5.2_MRSA	7.5000	1.13578	3
Total	1.8148	2.98780	54

### Test of Homogeneity of Variances

Daya\_hambat

Levene Statistic	df1	df2	Sig.
8.020	17	36	.000

### ANOVA

Daya_hambat	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	467.135	17	27.479	165.055	.000
Within Groups	5.993	36	.166		
Total	473.128	53			