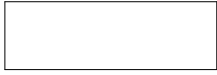


Development of Fermented Wine by
Wild Vine Produced in Korea



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1995. 12. .

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가 가

(1)

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, pH,

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1.
11%
가
가 가
2.
가 가
23 가
가 가
3.
가 가
2

4. 가

5. 가. , 30% 23 가
가 가 2%

6. 가 가 가 5

(20kg) 20kg
 $20\text{kg} \times 5,000 = 100,000\text{kg}$
가 kg 2,000 가 2
($100,000\text{kg} \times 2,000 = 200,000,000$)

가

가 가 가 가 .
 . (가)
 (1) 가 가
 . , 1% 100M/T 0.01 × 100M/T =
 1M/T 가 가 .
 (2) 가

7.

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U.R.

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가 가

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Summary

Some chemical components, in order to develop wine of wild vine produced in Korea, were analyzed, and harvested wild vine that prepared wine some different conditions such as adjusted sugar concentration(20, 30 and 35%) and fermentation temperature(13, 22 13 and 28), analyzed during fermentation and sensory test did.

The results were as follows.

1. Analysis of chemical components

Chemical components of wild vine in edible portion was 87% of moisture, 1.1% of crude protein, 0.6% of crude ash, 11.3% of total sugar, 2.5mg% of total acid and 3.9 of pH. Organic acids composition of wild vine were much content of tartaric acid(23mg%), citric acid(12mg%) and malic acid(7.2mg%)

2. Analysis of wild vine wine

Content of sugar decreased more rapidly in 13 than in room temperature(22- 13) and 28 , but number of yeast and bacteria showed increasing phenomenon. Production amounts of alcohol was highest in room temperature(22- 13) of them, the next order was 28 and 13 . 30% Glucose sample was similar to 30% sugar sample in alcoholic production amounts. Alcoholic production have a tendency in proportion to the yeast number, and number of cell was much as 11.5×10^6 cell/ml of them. The analysis of sensory

test was difficult to accurate conclusion because the fermentation period was short, but 35% sugar sample fermented for 78 days was very good estimation.

3. Improvement of fermenter

Improved fermenter used set vacuum controller, thermometer, cooling system and sample injection hole etc.

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1	13
2	15
3	17
1	17
2	17
3	18
4	24
533

1

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가 가

가 UR 가

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anthocyanin

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Igarashi anthocyanin Shtin
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(1) (2) (3) , , , ,
pH, , yeast cell bacteria cell ,
(1) (2)

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, (1)
, (2)
(1) 가 (2)
가 (3)

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2

1 .

1,

2.

1%

3-5

65% (V/W)

0.45 μ m membrane filter

2 .

1.

Somogyi , brix refractometer ,

AOAC .

2.

0.45 μ m membrane filter

sep-pak C18

Supelcogel C- 610H(Hydrogen- form

resin)

HPLC(High Performance Liquid Chromatography, Waters

Associates) 0.1% phospho acid .

(Sigma) oxalic acid(0.01%), tartaric acid(0.05%), malic acid(0.1%), citric acid(0.1%), acetic acid, lactic acid succinic acid(0.1%)

3

1 .

1995. 7. 14 9 28 10

Table 1. Picked times of wild vine

	1	2	3	4	5	6	7	8	9	10
	July 14	July 28	Aug. 11	Aug. 25	Sep. 1	Sep. 6	Sep. 12	Sep. 15	Sep. 18	Sep. 28

2 .

Table 2. General components of wild vine

Items \ Time	Picked time(month/day)									
	7/14	7/28	8/11	8/25	9/1	9/6	9/12	9/15	9/18	9/28
Moisture(%)	85.1	84.5	86.0	87.2	85.3	86.5	87.0	86.9	86.0	86.5
Crude protein(%)	-	-	-	-	-	1.2	1.1	1.1	1.0	1.0
Curde ash(%)	-	-	-	-	-	0.69	0.57	0.53	0.38	0.52
Total sugar(%)	2.5	3.1	5.3	7.3	9.2	10.1	11.3	11.0	10.7	11.0
Total acid(mg%)	3.2	3.2	3.1	3.0	2.7	2.6	2.5	2.5	2.6	2.6
pH	3.7	3.7	3.7	3.8	3.9	3.9	3.9	3.9	3.9	3.9

가 ,

가 .

pH 가 .

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가

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3 .

1.

Sep- pak C18 Supelcogel C- 610H

(3.9mm × 30cm. Waters, USA) HPLC 0.1% phosphoric acid

. oxalic acid, citric acid, tratraic acid.

malic acid, succinic acid, formic acid, latic acid, acetic acid fumaric acid

.

2.

Table 3. Operating conditions of HPLC for organic acids analysis

Item	Condition
Instrument	Water Associates
Column	Supelcogel C- 610H (Hydrogen- form resin)
Column temperature	30
Mobile phase	0.1% phosphoric acid
Flow rate	0.5 ml/min.
Injection volume	5 μl

3. 분석결과

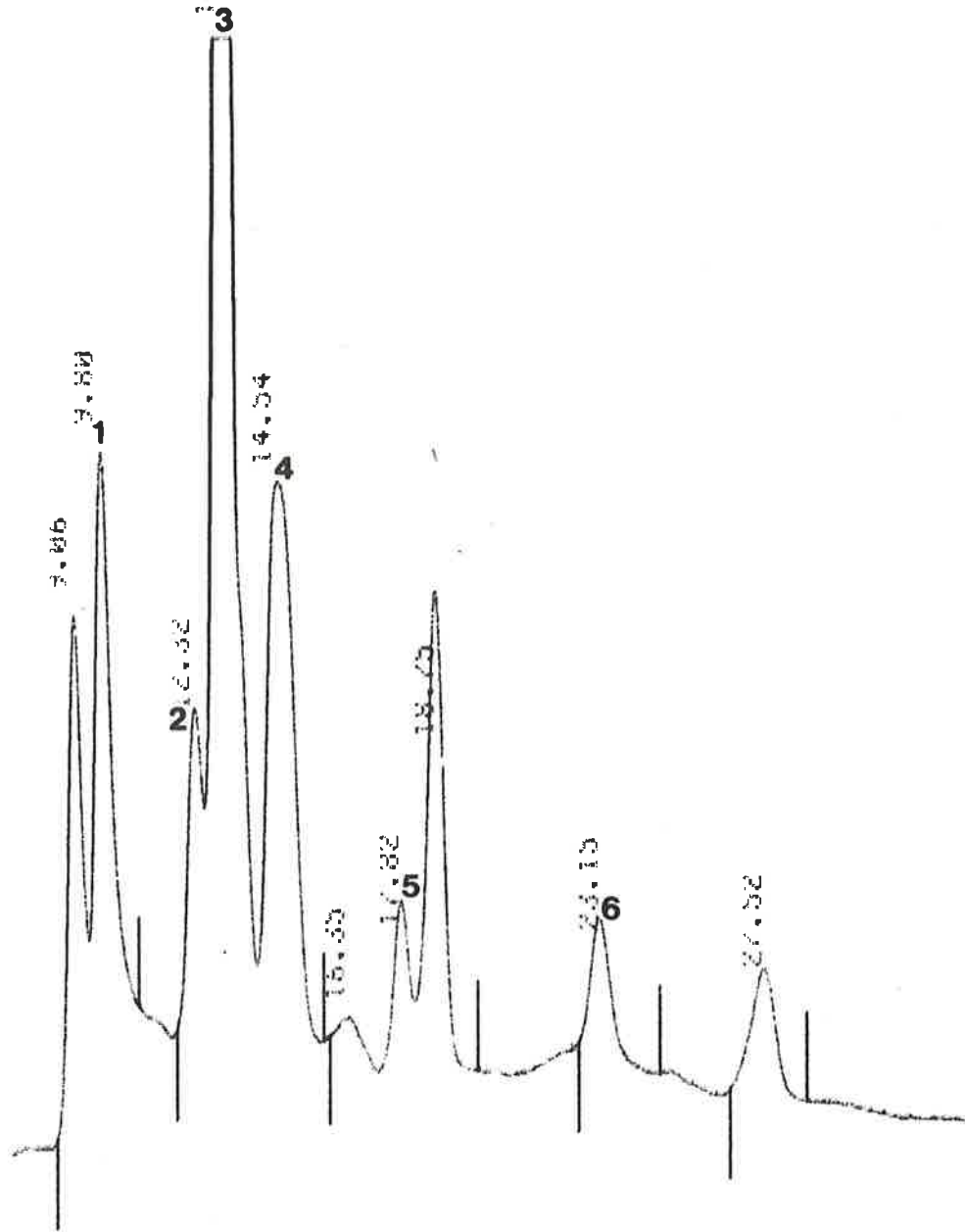


Fig 1. Chromatogram of organic acids in wild vine picked at sep. 1, 1995.

1:Oxalic acid, 2:Citric acid, 3:Tartaric acid, 4:Malic acid,
5:Succinic acid, 6:Fumaric acid

Table 4. Organic acids compositions of wild vine

(nit : mg/ml, Juice)

O r g a n i c acids	Picked time	R.T. (min)	July.14	July.28	Aug.11	Aug.25	Sep.1	Sep.6	Sep.12	Sep.15	Sep.18	Sep.28
	Oxalic acid	9.75	0.01	0.01	0.01	0.08	0.14	0.08	0.04	ND ¹⁾	ND	ND
Citric acid	12.28	0.92	1.24	1.24	7.21	10.22	11.24	11.99	11.32	11.35	10.75	
Tartaric acid	12.96	6.57	7.25	7.25	15.84	18.96	22.78	22.89	22.76	21.97	20.25	
Malic acid	14.38	9.02	10.34	10.34	12.31	9.12	8.23	7.98	7.61	7.28	7.38	
Succinic acid,	17.85	1.99	2.04	2.04	2.94	3.42	3.45	2.44	2.78	2.89	2.91	
Formic acid	19.46	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
Fumaric acid	23.18	0.03	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.02	

1) ND means not detected.

Table . Tartaric acid, citric acid, malic acid가 9 12 Oxalic acid, succinic acid, formic acid, fumaric acid .

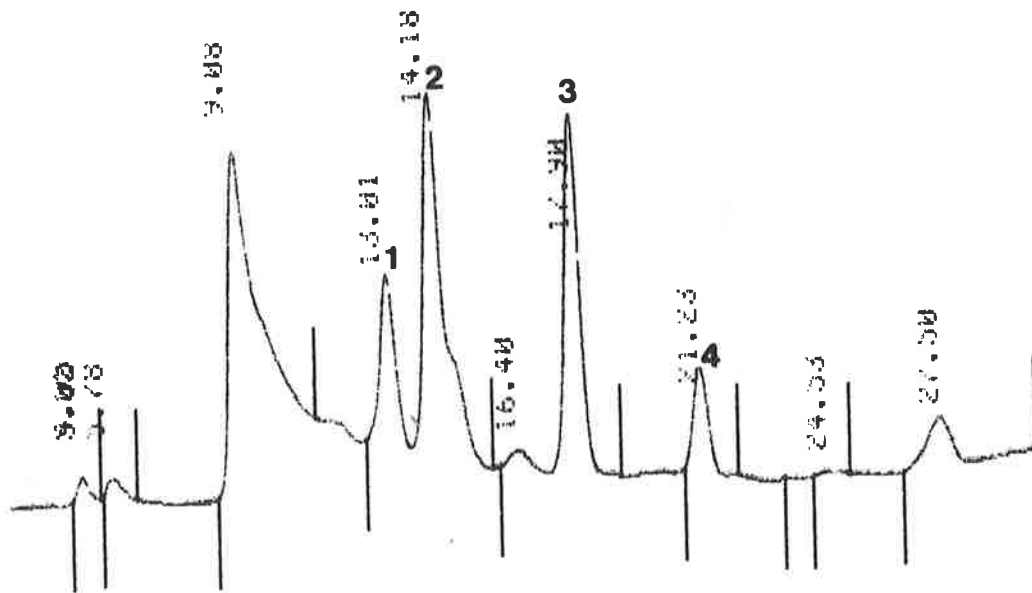


Fig 2. Chromatogram of organic acids in wild vine wine 35% sugar added and constant temperature(28°C) fermented for 78days.

1:Tartaric acid, 2:Malic acid, 3:Lactic acid, 4:Acetic acid

Table 5. Organic acids compositions of wild vine in some conditions

(unit : mg/ml)

Temp. Sugar ²⁾ Organic acids	R.T (min)	Raw temp. (13)			Room temp. (22- 13)				Constant temp. (28)		
		20%	30%	35%	20%	30%	30% ²⁾ Glucose	35%	20%	30%	35%
Oxalic acid	9.75	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Citric acid	12.28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tartaric acid	12.96	2.65	1.38	0.61	0.87	0.98	0.54	0.64	1.46	0.53	2.26
Malic acid	14.38	ND	ND	2.19	ND	7.52	ND	3.21	ND	ND	8.86
Lactic acid	17.90	24.70	17.02	26.51	19.78	24.91	19.61	20.32	29.64	18.55	17.14
Formic acid	19.46	ND	ND	ND	0.11	ND	ND	ND	ND	ND	ND
Acetic acid	21.13	5.98	4.28	3.61	1.46	2.74	1.90	2.30	4.56	4.08	3.29
Fumaric acid	23.18	ND	ND	ND	ND	0.004	ND	ND	ND	ND	ND

1) Sugar was added 20, 30 and 35% respectively.

2) Glucose was added with 30% instead of sugar.

3) ND means not detected

*Sampling was at Nov. 22, 1995 and its fermentation period was 78 days.

가

Table

가 .

Tartaric acid, citric acid, malic acid

, lactic acid가 2%

가

가

Table 6. Some components of wild vine wine fermented at various conditions added 20% sugar

Temperature Day Items	Low temp. (13)				Room temp. (22- 13)			Constant temp. (28)		
	0	32	59	78	32	59	78	32	59	78
	pH	3.81	3.89	3.85	3.80	3.87	3.80	3.76	3.73	3.78
Total acidr(w/v, %)	2.2	2.0	1.8	1.9	2.1	2.0	2.0	1.9	1.9	2.0
Total sugar(%)	23.0	14.5	10.8	7.6	13.0	9.9	5.8	12.1	11.1	9.7
Alcohol(%)	0	4.3	6.2	7.5	4.8	6.6	9.2	5.3	6.0	6.5

1) Total acid calculated with tartaric acid.

20% 가 pH, Table
 . pH (13), (22- 13) (28)
 . 23%
 78 7.6, 5,8 9.7%
 . 가 .

Table 7. Some components of wild vine wine fermented at various conditions added 30% sugar

Temperature Day Items	Low temp. (13)				Room temp. (22- 13)			Constant temp. (28)		
	0	32	59	78	32	59	78	32	59	78
pH	3.81	3.99	3.76	3.72	3.82	3.88	3.86	3.73	3.73	3.78
Total acidr(w/v, %)	2.2	1.5	1.5	1.6	1.5	1.4	1.7	1.4	1.6	1.8
Total sugar(%)	34.0	29.5	24.0	19.1	12.0	8.5	6.9	15.6	14.1	13.0
Alcohol(%)	0	2.2	4.8	7.2	10.7	12.6	13.7	9.0	9.8	10.7

1) Total acid calculated with tartaric acid.

30% 가 pH, Table
 . pH
 34% 가 78 19.1, 6.9 13.0%
 . 가 13 59
 가가 32
 10 7%, 9.0% 2.2% 가
 78 ,
 7.2, 13.7 10.7% .

Table 8. Some components of wild vine wine fermented at various conditions added 35% sugar

Temperature Day Items	Low temp. (13)				Room temp. (22- 13)			Constant temp. (28)		
	0	32	59	78	32	59	78	32	59	78
pH	3.81	3.78	3.71	3.69	3.72	3.79	3.78	3.81	3.83	3.82
Total acidr(w/v, %)	2.2	1.5	1.6	1.5	1.5	1.4	1.5	1.4	1.4	1.4
Total sugar(%)	39.0	28.6	28.0	27.3	19.0	17.1	15.0	19.8	18.2	18.1
Alcohol(%)	0	5.0	5.4	5.7	10.1	10.8	12.0	9.5	10.0	10.3

1) Total acid calculated with tartaric acid.

35% 가 20% 30% 가
 . pH ,
 . 30%
 가 20% .

Table 9. Some components of wild vine wine fermented at various conditions added 30% glucose

Items	Temperature	Room temp.		
	Day	(22- 13)		
		32	59	78
pH		3.81	3.79	3.85
Total acid(w/v, %)		2.2	1.3	1.54
Total sugar(%)		34.0	23.4	15.3
Alcohol(%)		0	5.3	9.2

Total acid calculated with tartaric acid.

35% 30% 가 .
 20% 가 .
 가 .

Table10. Some components of wild vine wine fermented at various conditions added 20% sugar

Temperature Day	Low temp. (13)			Room temp. (22- 13)			Constant temp. (28)		
	32	59	78	32	59	78	32	59	78
Items									
Yeast number (× 106 cell/Mℓ)	0.4	2.6	1.8	0.1	4.6	2.2	0.1	2.9	1.6
Bacteria number (× 106 cell/Mℓ)	13.1	15.0	7.2	19.0	18.0	2.4	1.6	15.2	3.2

1) Total acid calculated with tartaric acid.

20% 가 Table
 . (13). (22- 13) (28)
 가 59 4.6 × 106
 cell/ml 가 59 15.0, 18.0 15.2 ×
 106 cell/ml .

Table 11. Some components of wild vine wine fermented at various conditions added 30% sugar

Temperature Day	Low temp. (13)			Room temp. (22- 13)			Constant temp. (28)		
	32	59	78	32	59	78	32	59	78
Yeast number (× 10 ⁶ cell/Mℓ)	0.6	4.1	5.0	6.2	11.5	3.5	5.5	9.7	2.5
Bacteria number (× 10 ⁶ cell/Mℓ)	19.8	17.6	17.5	5.9	15.2	10.9	2.8	10.1	10.4

30% 가 Table
 . (13) 0.6, 4.1 5.0 ×
 10⁶ cell/ml 가 , 59 11.5 × 10⁶cell/ml
 . (28) 59 9.7
 × 10⁶cell/Mℓ 가 .
 , 59 15.2 × 10⁶cell/Mℓ
 가 78 . 59 78 가 .

Table 12. Some components of wild vine wine fermented at various conditions added 35% sugar

Temperature Day Items	Low temp. (13)			Room temp. (22- 13)			Constant temp. (28)		
	32	59	78	32	59	78	32	59	78
Yeast number (× 106 cell/Mℓ)	1.1	4.7	4.2	0.57	5.3	3.2	0.56	3.43	3.2
Bacteria number (× 106 cell/Mℓ)	14.3	15.6	15.8	7.1	14.0	10.5	5.8	14.0	12.6

35% 가 Table
 . 가 가 59
 20% 가 가
 30% 가 가 30% 가 .

Table 13. Some components of wild vine wine fermented at various conditions added 30% glucose

Temperature Day Items	Room temp. (22- 13)		
	32	59	78
Yeast number (× 106 cell/Mℓ)	3.7	4.8	5.0
Bacteria number (× 106 cell/Mℓ)	4.94	21.4	10.6

가 30% 가 , 32
 3.7 × 106 cell/Mℓ . 59 78 .

Table14. Sensory analysis sheet of wild vine wine

Item	Score
(Excellent)	5
(Very good)	4
(Good)	3
(Poor)	2
(Very poor)	1

Temperature Sugar (%)	Low temp. (13)			Room temp. (22- 13)				Constant temp. (28)		
	20	30	35	20	30	30 (glucose)	35	20	30	35
Items										
Score (5.0)	1.5	3.1	3.2	1.9	1.9	2.4	4.0	2.8	3.3	3.9

*Pannel was 20 and the score was mean.

*Sample was after fermentation 78 days.

가 20% 30% 가
가 35% (Data
) . 가 35% 35% 가
4.0 3.9 3

5절. 머루주의 발효기 개발

제원 : 발효기 10대 제작, 압력조절장치, 냉각관, 온도계, 배출구,
강관뚜껑 4mm, 지름 75cm, 길이 145cm, 용량 120L

제원에 따라 작성한 발효기의 축척도는 그림과 같다. 이것을 기초로 소형발효기의 개발 기초자료로 활용이 가능하다.

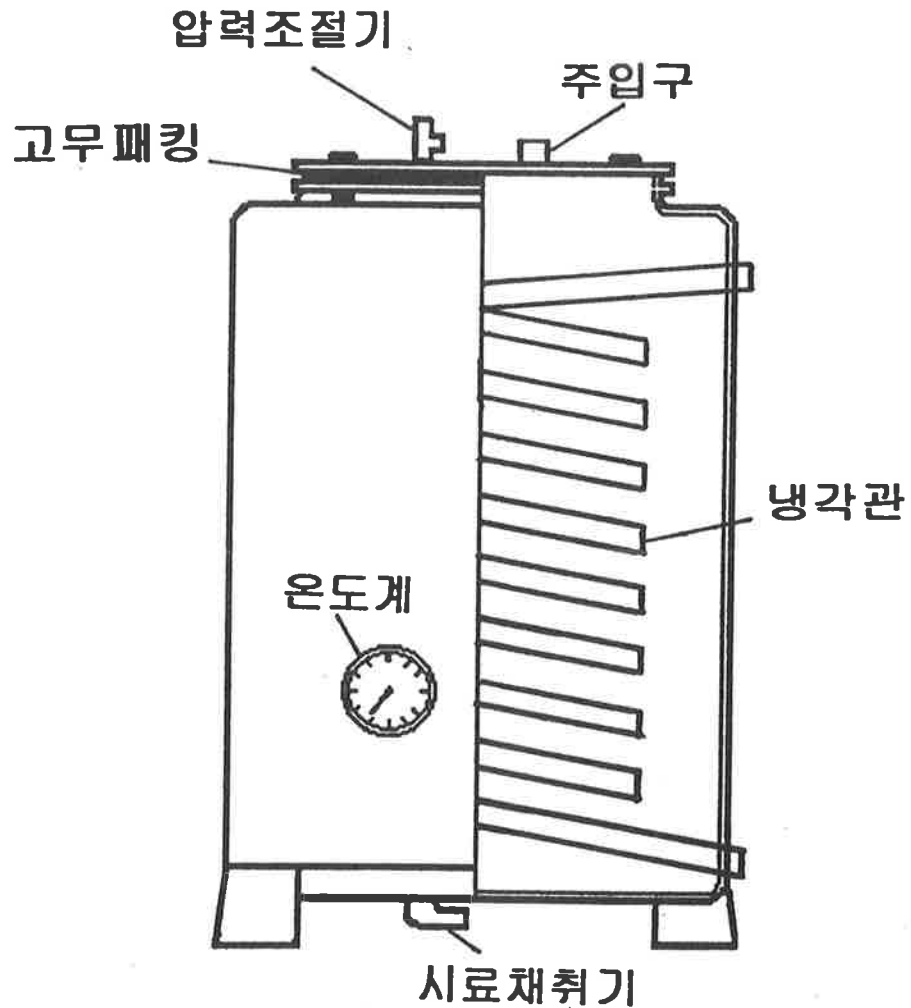


Fig. 3. Scheme of fermenter apparatus.

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2.

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3. 가

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