ALL INDIA COORDINATED RESEARCH PROJECT ON SUGARCANE

TECHNICAL REPORT

(2015-16)

CROP PRODUCTION
(Agronomy and soil science)

Sugarcane Research Station
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AGRONOMY

Project No AS-42

Title: Agronomic Evaluation of Promising Sugarcane Genotypes (Early group).

The experiment was conducted to work out agronomy of sugarcane genotypes of advanced varietal trial (AVT) with the following genotypes:

V1: CoBln 14501
V2: CoBln 14502
V3: CoBln 14503
V4: CoBln 9103 (Check)

In the experiment, there were three levels of fertilizers viz.-

F1: 75% of the recommended dose of NPK
F2: 100% of the recommended dose of NPK
F3: 125% of the recommended dose of NPK

Plant Crop:

The genotypes were planted on 30th March, 2015 and harvested on 15th January, 2016. The experimental soil was clay loam in texture, medium in organic carbon (0.78 %) and low in available P (18.8 kg P_2O_5/ ha) and medium in available K (224 Kg K_2O/ ha) with pH 5.08

Results: The data on 2nd year trial on "agronomic evaluation of early maturing promising sugarcane genotypes" under three fertilizers levels is presented in table AS-42-01. The result revealed that among the all genotypes, CoBln 14503 recorded significantly the highest number of millable cane (92.97 thousand/ha), Cane diameter (2.57cm), cane yield (67.52 t/ha) than all other genotypes.

Among the three fertilizer levels, application of 125% of the recommended dose of NPK recorded significantly the higher cane yield (61.98t/ha) than the yield recorded by the application of 75% of the recommended dose of NPK (48.85t/ha) and 100% of the recommended dose of NPK (57.16t/ha) respectively. Moreover, application of 125% of the recommended dose of NPK also improved the juice quality parameters than other two fertilizer levels.

Table AS-42-01: Effect of genotypes (early group) and fertilizer levels on performance of Sugarcane. (Plant crop)

Treatments	Germination (%)	NMC (000/ha)	Cane length (m)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
Genotypes							
CoBln 14501	42.87	85.74	2.27	2.31	18.14	59.95	12.97
CoBln14502	26.74	51.84	2.29	2.39	18.18	36.46	13.19
CoBln 14503	42.14	92.97	2.30	2.57	18.48	67.52	13.42
CoBln 9103 (check)	39.83	87.43	2.25	2.47	18.06	60.07	13.18
CD (0.05)	3.12	5.05	NS	0.09	NS	2.99	0.22
Fertility Levels							
F_1 (75% of RD of NPK)	37.19	72.94	2.24	2.30	17.72	48.85	12.81
F_2 (100% of RD of NPK)	38.67	79.58	2.27	2.47	18.29	57.16	13.22
F_3 (125% of RD NPK)	37.83	85.97	2.33	2.54	18.64	61.98	13.48
CD (0.05)	NS	4.37	0.03	0.08	0.35	2.59	0.18

Ratoon Crop:

The first year ratoon crop was harvested on 15.11.2015

Result: The data on growth, cane yield and quality parameters of first year ratoon crop on "agronomic evaluation of early maturing promising sugarcane genotypes" under three levels of fertilizer are presented in table AS-42-02. All the genotypes showed significant differences on growth and cane yield. Among the genotypes, CoBln14503 recorded significantly higher number of millable canes (74.76thousand/ha) and cane yield (62.28 /ha) followed by the check (CoBln 9103) which recorded the number of millable canes (66.71thousand/ha), cane yield (51.10 t/ha) respectively.

Among the three fertilizer levels, application of 125% of the recommended dose of NPK recorded significantly the higher cane yield (55.26 t/ha) than the yield recorded by the

application of 75% of the recommended dose of NPK (46.76 t/ha) but statistically at par with the yield recorded by 100% of the recommended dose of NPK (51.27t/ha). Moreover, application of 125% of the recommended dose of NPK also improved the juice quality parameters than other two fertilizer levels.

Table AS-42-02: Effect of genotypes (early group) and fertilizer levels on performance of Sugarcane. (Ratoon)

Treatments	**NMC (000/ha)**	**Cane length (m)**	**Cane diameter (cm)**	**Sucrose (%)**	**Cane yield (t/ha)**	**CCS (%)**
Genotypes						
CoBln 14501	60.68	2.40	2.45	17.40	47.37	12.20
CoBln14502	49.96	2.29	2.40	17.55	39.97	12.27
CoBln 14503	74.76	2.52	2.51	17.95	62.28	12.84
CoBln 9103 (check)	66.71	2.45	2.46	17.69	51.10	12.63
CD (0.05)	3.91	0.05	0.05	NS	4.78	0.04
Fertility Levels						
F_1 (75% of RD of NPK)	57.65	2.34	2.39	17.24	46.76	12.17
F_2 (100% of RD of NPK)	62.91	2.41	2.46	17.63	51.27	12.52
F_3 (125% of RD NPK)	68.53	2.49	2.51	18.07	55.26	12.77
CD (0.05)	3.39	0.04	0.04	0.36	4.14	0.03

Project No. II

AS.42. Agronomic evaluation of promising Sugarcane genotype (Mid-late group) - Plant crop.

The experiment was conducted to work out agronomy of sugarcane genotypes of advanced varietal trial (AVT) with the following genotypes:

i) Co Bln 14504
ii) Co Bln 14505
iii) Co Bln 14506
iv) Co Bln 94063 (check)

In the experiment, there were three levels of fertilizers viz.-

i) 75% of recommended dose of NPK
ii) 100% of recommended dose of NPK
iii) 125% of recommended dose of NPK

Plant Crop:

The genotypes were planted on 7th April, 2015 and harvested on 23rd March, 2016. The experimental soil was clay loam in texture, medium in organic carbon (0.78 %) and low in available P (18.8 kg P_2O_5/ ha) and medium in available K (224 Kg K_2O/ ha) with pH 5.08

Results: The data on 2nd year trial on "agronomic evaluation of four mid-late maturing promising sugarcane genotypes" under three fertilizers levels is presented in table AS-42-03. Results revealed that among the genotypes, CoBln 14505 recorded the higher cane yield (64.21 t/ha) which is statistically at par with the yield recorded by CoBln 14504 (60.50 t/ha) but significantly superior than the yield recorded by CoBln 14506 (45.65t/ha) and CoBln 94063 (45.21 t/ha) respectively. However no significant differences were observed in terms of juice quality parameters among the four genotypes.

Among the three fertilizer levels, application of 125% of the recommended dose of NPK recorded significantly the higher cane yield (63.54/ha) than the yield recorded by the application of 75% of the recommended dose of NPK (44.61/ha) and 100% of the recommended dose of NPK (53.54/ha) respectively. Moreover, application of 125% of the recommended dose of NPK also improved the juice quality parameters than other two fertilizer levels.

Table AS-42-03: Effect of genotypes (Mid-late group) and fertilizer levels on performance of Sugarcane. (Plant crop)

Treatments	Germ-ination (%)	No.of shoots (000/ha)	NMC (000/ha)	Cane length (mm)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
Genotypes								
CoBln 14504	28.20	54.33	51.88	2.61	2.78	19.25	60.50	12.58
CoBln 14505	31.70	56.60	54.69	2.63	2.64	19.19	64.21	12.39
CoBln 14506	28.60	45.66	42.16	2.60	2.59	18.96	45.65	12.56
CoBln 94063 (check)	35.70	46.94	43.39	2.76	2.66	19.02	45.21	12.74
CD at 5%	3.61	7.38	6.94	NS	NS	NS	5.53	NS
Fertility Levels								
F_1 (75% of RD of NPK)	29.71	45.96	43.54	2.50	2.70	18.32	44.61	12.00
F_2 (100% of RD of NPK)	32.30	52.54	49.58	2.68	2.66	19.24	53.54	12.60
F_3 (125% of RD NPK)	31.16	61.65	58.47	2.77	2.65	19.76	63.54	13.11
CD at 5%	NS	6.38	6.01	0.15	NS	0.45	4.78	0.37

Ratoon Crop:

The data on growth, cane yield and quality parameters of first year ratoon crop on "agronomic evaluation of mid-late maturing promising sugarcane genotypes" under three levels of fertilizers are presented in table AS-42-04. Result revealed that like the the plant crop in case of ratoon also CoBln 14505 recorded significantly the higher number of millable cane (67.41 thousand/ha), cane yield (57.58 t/ha) respectively than all other genotypes.

Among the three fertilizer levels, application of 125% of the recommended dose of NPK recorded significantly higher cane yield (50.65 t/ha) than the yield recorded by the application of 75% of the recommended dose of NPK (42.63 t/ha) but statistically at par with the yield recorded by 100% of the recommended dose of NPK (47.31 t /ha) respectively. Moreover, application of 125% of the recommended dose of NPK also improved the juice quality parameters than other two fertilizer levels.

Table AS-42-04: Effect of genotypes (Mid-late group) and fertilizer levels on performance of Sugarcane. (Ratoon crop)

Treatments	NMC (000/ha)	Cane length (mm)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
Genotypes						
CoBln 14504	50.36	2.30	2.39	18.17	41.86	11.97
CoBln 14505	67.41	2.35	2.39	17.87	57.58	12.29
CoBln 14506	53.88	2.20	2.08	17.10	43.35	11.74
CoBln 94063	55.30	2.32	2.39	17.29	44.67	12.07
CD at 5%	5.45	0.072	0.097	0.42	4.02	NS
Fertility Levels						
F_1 (75% of RD of NPK)	51.77	2.21	2.26	17.26	42.63	11.74
F_2 (100% of RD of NPK)	56.87	2.28	2.32	17.56	47.31	12.01
F_3 (125% of RD NPK)	61.58	2.38	2.36	18.0	50.65	12.31
CD at 5%	4.72	0.06	0.09	0.36	3.49	0.35

AS-69: Use of plant growth regulators (PGRs) for enhanced yield and quail of sugarcane

Objectives:

1. To accelerate rate and extent of sugarcane germination through the use PGRs
2. To assess the effect of PGRs on sugarcane growth, yield and juice quality.

Treatments:

T1: Conventional planting/farmers' practice (3 bud setts)
T2: Planting of setts after overnight soaking in water.
T3: Planting of setts after overnight soaking in 50 ppm ethrel solution
T4: Planting of setts after overnight soaking in 100 ppm ethrel solution'
T5: T1+ GA_3 spray (35ppm) at 90,120 and 150 DAP
T6: T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP
T7: T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP
T8: T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP

The crop was planted on 10th April, 2015 and harvested on 7th April, 2016. The experimental soil was clay loam in texture, medium in organic carbon (0.78 %) and n low in available P (18.8 kg P_2O_5/ ha) and medium in available K (224 Kg K_2O/ ha) with pH 5.08

Result:

The germination percentage counted at 10 days interval after planting revealed that there was significance difference in germination among all the treatments. Planting of setts after overnight soaking in water (T_2), Planting of setts after overnight soaking in 50 ppm ethrel solution (T_3), Planting of setts after overnight soaking in 100 ppm ethrel solution(T_4) significantly increased the germination% over conventional planting (T_1) (Table-AS-69-01).

Likewise, in terms of cane yield all the treatments recorded significantly the higher cane yield than conventional planting. Out of all treatments, planting of setts after overnight soaking in 100 ppm ethrel solution along with spraying of GA3 (35ppm) at 90,120 and 150 DAP recorded significantly the highest cane yield (63.7 t/ha) which is statistically at par with the cane yield (63.3 t/ha) recorded by the treatments T_6 ((63.3 t/ha), T_7 (59.7t/ha), T_2 (57.3 t/ha) respectively (Table AS-69-02).

The same treatment (T_8) also recorded the highest biomass accumulation at 120 DAP (67.1gm), 150 DAP (106.0gm) & 180 DAP (318.3 g), respectively (Table AS-69-04). Similarly, all the treatments recorded significantly higher leaf area index in all the growing stage than then conventional practice (Table-AS-69-05)

Table- AS-69-01: Effect of different on germination % of sugarcane

Treatments	**Germination 10 DAP**	**Germination 20 DAP**	**Germination 30 DAP**	**Germination 40 DAP**	**Germination 50 DAP**
T1: Conventional planting	5.2	14.0	18.0	27.2	36.3
T2: Planting of setts after overnight soaking in water.	10.9	18.3	23.7	29.9	37.5
T3: Planting of setts after overnight soaking in 50 ppm ethrel solution	8.8	15.9	18.6	30.9	36.9
T4: Planting of setts after overnight soaking in 100 ppm ethrel solution'	9.3	17.6	22.8	30.2	41.1
T5: T1+ GA_3 spray (35ppm) at 90,120 and 150 DAP	5.5	14.1	18.7	27.3	34.3
T6: T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP	11.0	16.9	19.9	29.2	36.7
T7: T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP	10.5	19.1	23.3	30.9	39.1
T8: T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP	10.4	18.9	22.1	32.3	42.0
CD(0.05)	1.64	2.19	3.49	2.03	3.98

AS-69-02: Effect of plant growth regulators (PGRs) on yield and quality of sugarcane

Treatments	NMC (000/ha)	Cane length (cm)	Cane diameter (cm)	Sucrose (%)	Cane yield (t/ha)	CCS (%)
T1: Conventional planting	67.2	149.1	2.4	17.0	43.6	12.3
T2: Planting of setts after overnight soaking in water.	75.8	160.1	2.5	17.8	57.3	12.7
T3: Planting of setts after overnight soaking in 50 ppm ethrel solution	74.1	155.5	2.5	17.5	56.4	12.6
T4: Planting of setts after overnight soaking in 100 ppm ethrel solution'	73.8	163.5	2.5	17.6	52.3	12.7
T5: T1+ GA_3 spray (35ppm) at 90,120 and 150 DAP	70.9	157.5	2.4	17.2	47.0	12.4
T6: T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP	78.3	160.0	2.5	17.9	63.3	12.9
T7: T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP	75.2	157.6	2.5	18.0	59.7	13.0
T8:T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP	81.1	165.0	2.5	17.9	63.7	12.9
CD(0.05)	3.17	8.53	0.08	0.28	8.23	0.28

Table AS-69-03: Effect of plant growth regulators (PGRs) on plant height (cm) recorded at monthly interval.

Treatments	30 DAP	60 DAP	90 DAP	120 DAP	150 DAP	180 DAP	210 DAP	240 DAP	270 DAP	300 DAP
T1: Conventional planting	20.9	38.8	93.6	123.0	149.1	153.3	181.0	197.5	225.7	237.0
T2: Planting of setts after overnight soaking in water.	21.3	41.7	96.5	133.7	160.1	185.7	208.6	214.8	239.7	249.3
T3: Planting of setts after overnight soaking in 50 ppm ethrel solution	20.7	39.5	94.6	132.3	155.5	182.7	203.6	211.0	236.1	254.0
T4: Planting of setts after overnight soaking in 100 ppm ethrel solution'	20.0	39.1	95.4	138.3	163.5	190.0	207.3	212.5	241.4	258.7
T5: T1+ GA_3 spray (35ppm) at 90,120 and 150 DAP	20.8	43.8	98.5	131.0	157.5	169.7	189.3	198.2	235.3	247.3
T6: T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP	20.2	40.8	97.1	135.3	160.0	190.3	204.2	227.0	249.3	259.0
T7: T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP	19.1	39.2	94.0	132.0	157.6	189.3	205.4	213.0	241.3	248.7
T8: T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP	20.4	44.3	100.9	141.7	165.0	199.0	215.0	229.0	249.0	260.7
CD(0.05)	NS	NS	NS	8.35	8.53	19.36	6.35	12.27	5.86	11.65

Table AS-69-04: Effect of PGRS on Biomass accumulation (gm/plant) & Root dry weight (gm/plant) in Sugarcane

Treatments	Biomass accumulation (90 DAP)	Biomass accumulation (120 DAP)	Biomass accumulation (150 DAP)	Root dry weight (50DAP)	Root dry Weight (120DAP)
T1: Conventional planting	35.2	71.3	191.3	2.8	10.1
T2: Planting of setts after overnight soaking in water.	64.2	100.0	269.3	6.2	15.0
T3: Planting of setts after overnight soaking in 50 ppm ethrel solution	54.1	91.3	283.3	4.5	14.4
T4: Planting of setts after overnight soaking in 100 ppm ethrel solution'	57.2	101.3	300.0	6.0	16.0
T5: T1+ GA_3 spray (35ppm) at 90,120 and 150 DAP	42.3	79.3	244.7	3.6	7.6
T6: T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP	63.9	98.0	279.3	6.8	17.3
T7: T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP	59.1	96.0	294.3	3.6	12.3
T8: T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP	67.1	106.0	318.3	6.1	17.4
CD(0.05)	12.08	10.18	23.74	2.30	4.43

Table AS-69-05: Effect of PGRs on leaf area index (at monthly interval)

Treatments	**90DAP**	**120 DAP**	**150 DAP**	**180DAP**	**210DAP**	**240DAP**	**270DAP**	**300 DAP**
T1: Conventional planting	1.3	1.7	2.4	2.7	2.0	1.6	1.4	1.3
T2: Planting of setts after overnight soaking in water.	1.5	2.0	2.8	3.1	2.5	2.0	1.8	1.8
T3: Planting of setts after overnight soaking in 50 ppm ethrel solution	1.5	2.0	2.8	3.1	2.5	2.0	1.8	1.7
T4: Planting of setts after overnight soaking in 100 ppm ethrel solution'	1.6	2.1	2.8	3.1	2.6	2.3	1.9	1.8
T5: T1+ GA_3 spray (35ppm) at 90,120 and 150 DAP	1.3	1.8	2.5	2.8	2.2	1.8	1.4	1.5
T6: T2 + GA_3 spray (35ppm) at 90,120 and 150 DAP	1.6	2.0	2.8	3.2	2.6	2.0	1.9	1.8
T7: T3 + GA_3 spray (35ppm) at 90,120 and 150 DAP	1.6	2.2	2.8	3.2	2.5	2.0	1.8	1.7
T8: T4 + GA_3 spray (35ppm) at 90,120 and 150 DAP	1.6	2.2	2.8	3.2	2.6	2.1	2.0	2.0
CD(0.05)	0.1	0.15	0.21	0.19	0.2	0.18	0.11	0.19

Project V

AS-68: Impact of integrated application of organic and inorganic in improving soil health and sugarcane productivity.

Objectives: To develop nutrient management strategy for sustaining soil health and sugarcane productivity

The ratoon crop was initiated on 13th April, 2016. The experimental soil was clay loam in texture, medium in organic carbon (0.73 %) and low in available P (18.4 kg P_2O_5/ ha) and medium in available K (215 Kg K_2O/ ha) with pH 4.93

Treatments:

T_1: No organic + 50% RDF

T_2: No organic + 100% RDF

T_3: No organic + soil test based recommendation

T_4: Application of FYM/Compost@20 tonnes/ha + 50% RDF (inorganic source)

T_5: Application of FYM/Compost@20 tonnes/ha + 100% RDF (inorganic source)

T_6: Application of FYM/Compost@20 tonnes/ha + soil test based fertilizer.

T_7: Application of FYM/Compost@10 tonnes/ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + 50% RDF

T_8: Application of FYM/Compost@10 tonnes/ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + 100% RDF

T_9: Application of FYM/Compost@10 tonnes/ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + soil test based fertilizer.

Result: Like the plant crop, in the first year ratoon crop**,** application of FYM @10 tonnes /ha along with biofertilizer and inorganic fertilizer based on soil test recorded significantly the higher cane yield **(**65.3t/ha) which is statistically at par with application of FYM @10 tonnes/ha along with biofertilizer (Azotobacter + PSB) and 100% RDF tonnes/ha (64.3 t/ha) and the yield recorded by application of FYM t@20 tonnes/ha along with soil test based fertilizer (60.5 t/ha) respectively (Table- AS-68-01).

In case of economics of cultivation, application of FYM/Compost@10 tonnes/ha along with biofertilizer + soil test basis nutrient application recorded the highest gross return

Rs.1, 63,250 than all other treatments, however the highest B:C ratio was recorded by application of FYM @10 tonnes/ha along with biofertilizer and 100% RDF (1.76).

Table AS-68-01: Effect of integrated application of organic and inorganic nutrients on yield and quality of sugarcane

Treatments	Plant Population 45DARI	No. of shoots (000/ha) 120DAP	No. of shoots (000/ha) 150DAP	NMC (000/ha)	Cane length (mm)	Cane diameter (cm)	Cane yield (t/ha)	Sucrose (%)	CCS (%)
T_1	84.0	84.6	88.3	85.4	2.4	2.4	41.3	16.4	11.9
T_2	93.7	93.3	98.2	93.0	2.4	2.5	53.8	17.3	12.6
T_3	94.4	93.1	100.0	93.9	2.5	2.5	56.6	17.5	12.6
T_4	86.0	83.6	89.3	88.8	2.4	2.4	53.5	16.8	12.2
T_5	92.0	93.7	95.7	95.3	2.5	2.5	57.7	17.4	12.5
T_6	102.3	98.4	104.4	96.0	2.6	2.5	60.5	17.5	12.7
T_7	89.8	85.0	89.1	88.9	2.4	2.4	47.4	16.6	12.1
T_8	97.7	98.1	97.2	96.5	2.5	2.5	64.3	17.6	12.8
T_9	97.8	101	105.5	98.2	2.5	2.5	65.3	17.7	12.8
CD 5 %	6.72	8.73	9.63	4.18	0.05	0.03	6.65	0.32	0.28

Table AS-68-02: Economics of cultivation

Treatments	Cost of cultivation/ha (Rs)	Gross return/ha (Rs)	B:C
No organic + 50% RDF	65,475.00	10,32500.00	1.58
No organic + 100% RDF	79,725.00	1,345,00.00	1.69
No organic + soil test based RD	81,625.00	141500.00	1.73
FYM @20 tonnes/ha + 50% RDF	86,475.00	133,750.00	1.55
FYMt@20 tonnes/ha + 100% RDF	100,725.00	1,44,250.00	1.43
FYM/Compost@20 tonnes/ha + soil test basis	102,625.00	1,51,250.00	1.48
FYM/Compost@10 tonnes/ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + 50% RDF	77,025.00	1,18,750.00	1.54
FYM/Compost@10 tonnes/ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + 100% RDF	91,025.00	1,60,750.00	1.77
FYM/Compost@10 tonnes/ha + biofertilizer (Azotobacter/ Acetobacter + PSB) + soil test basis.	92875.00	1,63,250.00	1.76

Meteorological data-2015-16

Month/year	Temperature (^{0}c)		Average RH (%)	Rain Fall (mm)	No of rainy days
	Max	Min.			
February, 15	31	4.5	83.0	20.2	3
March, 15	34	20.6	75.9	34.4	2
April, 15	36	17.2	69.6	236.4	10
May,15	36	20.5	87.9	293.8	16
June,15	36.6	22.2	89.9	224.3	15
July,15	37.4	24.0	89.3	233	9
August,15	36.6	23.6	91.3	183.6	16
Sptember,15	35.6	23.1	92.5	245.4	11
October,15	35.6	22.6	87.8	245.4	11
November.15	30	17.3	57.4	21.8	2
December,15	28	17.6	85.9	28.2	2
January,16	26	21.8	85.1	25.1	2
February,16	30	12.2	84.0	0.2	-