

NOTICE OF RELEASE OF LEELANAU GERMPLASM HIGHBUSH CRANBERRY
SELECTED CLASS OF NATURAL GERMPLASM

by

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
EAST LANSING, MICHIGAN

MICHIGAN ASSOCIATION OF CONSERVATION DISTRICTS
LAKE CITY, MICHIGAN

and

MICHIGAN DEPARTMENT OF NATURAL RESOURCES
LANSING, MICHIGAN

The Natural Resources Conservation Service (NRCS), U.S. Department of Agriculture, Michigan Association of Conservation Districts (MACD) and the Michigan Department of Natural Resources (**MDNR**) announce the release of a selected ecotype of highbush cranberry (*Viburnum opulus* var. *americanum* Aiton) for the Great Lakes region.

As a selected release, this plant will be referred to **as Leelanau** Germplasm highbush cranberry to document its original collection location. It has been assigned the NRCS accession number 9031863.

This alternative release procedure is justified because existing cultivars of highbush cranberry have originated from Minnesota sources and there is an immediate need for locally native shrubs as alternatives for non-native species.

Collection Site Information: Seed was collected in 1981 by Dorian Carroll at R **11 W**, T **28 N** in Leelanau County, Michigan. The original plants were grown from this **seed**, however all other propagation has been from cuttings from these original plants.

Description: Leelanau Germplasm highbush cranberry is a native tall **shrub**, growing up to **4** meters tall. It has multiple stems and a rounded growth form, although it is taller **than** it is wider. The description is consistent with the literature. The leaves are paired, deeply three lobed, palmately veined and coarsely toothed. The flowers are white, in flat clusters with larger (**15** to **25** mm. wide) sterile flowers around the margins. It blooms in late May. The ripe fruit is red, **10** to **15** mm. long, with a single stone and is persistent. There are various opinions as **to** how distinct this species is from the European *V. opulus*. There is considerable variation in both species and they do cross. The Leelanau Germplasm **has** the convex petiole glands associated with the American variety. Some of these glands are stalked which is a further indication that it is the New World variety. The Agricultural Research Service has identified it **as** such.

Method of Selection: Fifty-eight collections made within the Rose Lake PMC Service Area were initially evaluated from 1985 to **1987** for survival, vigor, foliage abundance and density, growth characteristics, disease and insect resistance. Leelanau Germplasm and two other top accessions were chosen for further evaluation.

In advanced evaluations from **1988** to **1995**, the Leelanau collection outperformed the other **two** accessions in survival, vigor, foliage abundance, foliage density and rooting success **from** cuttings.

See the attached *Data to Support Release of Leelanau Germplasm Highbush Cranberry* for additional information.

Environmental Impact Assessment: Leelanau Germplasm highbush cranberry is a selection of naturally occurring germplasm and **has** been unaltered. Leelanau Germplasm did not meet the assessment of a plant which could become invasive based on the guidelines adopted by the NRCS Plant Materials Program.

Anticipated Conservation Use: Leelanau Germplasm is intended for use as a windbreak species on organic or wet soils. It may have some value for wildlife, as an alternative to introduced shrub species. However, as with the taxonomy, opinions differ **as** to how much use wildlife makes of the fruit. The American variety is generally considered more palatable than the European.

Adaptation: The species range is throughout northern North America. The anticipated area of use is within the Great Lakes region, which is well within the species range. Leelanau Germplasm grows best on moist or organic soils. It **does** not do well on *dry* sites.

Availability of Plant Materials: The USDA-Natural Resources Conservation Service, Rose Lake Plant Materials Center, **7472** Stoll Road, East **Lansing**, Michigan **48823**, will maintain a Generation **0** cutting block (equivalent to Breeder Class) of Leelanau Germplasm highbush cranberry. Hardwood cuttings and rooted cuttings will be made available to commercial producers for increase purposes.

References:

Gleason H. **1963**. *The New Britton and Brown Illustrated Flora. Vol. 3*. New **York** Hafner Publishing Company. **595** pp.

Voss, E. **1996**. *Michigan Flora. Part III, dicots concluded*. Cranbrook Institute of Science Bulletin **61** and University of Michigan Herbarium. Ann Arbor, MI: Cranbrook Institute of Science. **622** pp.

Wood T. Zelinka Nursery, Grand Haven, MI, personal communication

Wyman D. **1970**. *Shrubs and Vines for American Gardens*. New **York** Macmillan Company. **613** pp.

Prepared by: P. L. **Koch**, T. Bush, **Y** Golod, USDA-Natural Resources Conservation Service, Rose Lake Plant Materials Center, **7472** Stoll Road, East Lansing, Michigan **48823**

Signatures for release of:

Leelanau Germplasm highbush cranberry (*Viburnum opulus var. americanum* Aiton)

Jane E. Hardisty, State Conservationist
United States Department of Agriculture
Natural Resources Conservation Service
East Lansing, Michigan

Date

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Date

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Date

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Michigan Association of Conservation Districts
Lake City, MI

Date

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**DATA TO SUPPORT RELEASE OF LEELANAU GERMPLASM
HIGHBUSH CRANBERRY**

Selected Class Name: Leelanau Germplasm highbush cranberry

Accession Numbers: 9031863, (formerly, control number **26-2044**)

Common Names: highbush cranberry, American cranberrybush

Scientific Names: *Viburnum opulus* var. *americanum* Aiton, *V. trilobum* Marshall,
V. opulus spp. *trilobum* (Marshall) R. T. Clausen

Symbol: VIOPA2

Description: Leelanau Germplasm highbush cranberry is a native tall **shrub**, growing up to 4 meters tall. It has multiple stems and a rounded **growth** form, although it is taller than it is wider. The description is consistent with the literature. The leaves are paired, deeply three lobed, palmately veined and coarsely toothed. The flowers are white, in flat clusters with larger (15 to 25 mm. wide) sterile flowers around the margins. It blooms in late May. The ripe fruit is **red**, 10 to 15 mm. long, with a single stone and is persistent. There are various opinions **as** to how distinct **this** species is from the European *V. opulus*. There is considerable variation in both species and they do cross. The Leelanau Germplasm has the convex petiole glands associated with the American variety. Some of these glands are **staked**, which is a further indication that it is the New World variety. The Agricultural Research Service **has** identified it **as** such.

Origin: Seed was collected in 1981 by Dorian Carroll at R 11 W, T **28** N in Leelanau County, Michigan. The original plants were grown from this seed, however all other propagation **has** been from cuttings from these original plants.

Uses: Leelanau Germplasm is intended for use **as** a windbreak species on organic or wet soils. It may have some value for wildlife, **as** an alternative to introduced shrub species. However, **as** with the taxonomy, opinions differ **as** to how much use wildlife makes of the fruit. The American variety is generally considered more palatable than the European.

Performance: In 1984, 69 accessions of field collected **seed** were assembled at the Rose Lake Plant Materials Center. **An** initial comparative evaluation planting **was** established in May 1985, **using** material **grown** from this **seed**. These evaluations were carried out for three years. The Leelanau **Germplasm** had overall better survival and vigor (table 1), greater foliage abundance and density (table **2**) and superior uniformity. **Size** was comparable to other accessions (tables 3 and 8); disease and insect resistance were very good (table 4).

The Leelanau Germplasm and two other accessions were selected for advanced testing. In these evaluations the Leelanau Germplasm was again superior in survival, vigor and foliage abundance and density (tables **5, 6** and **7**). Drought, disease and insect resistance were again good (table 9). **A** review of the production history of the three accessions showed that the Leelanau Germplasm was the most dependable in terms of rooting success and in two of the three years had the highest percentage of rooting success (table 11).

Adaptation: Field Plantings were established, but destroyed before any meaningful data could be obtained. The species range is throughout northern North America. The anticipated area of use is within the Great Lakes region and is well within the species range.

Soils: Leelanau Germplasm **grows** best on moist or organic soils. It does not do well on *dry* sites.

Environmental Impact Assessment: Leelanau Germplasm highbush cranberry is a selection of naturally occurring germplasm and **has** been unaltered. Leelanau Germplasm did not meet the assessment of a plant which could become invasive based on the guidelines adopted by the NRCS Plant Materials Program.

Propagation: Leelanau Germplasm is propagated by cuttings. It has been successfully propagated from both hardwood and softwood cuttings.

Method of Establishment: Leelanau Germplasm **can** be successfully established using 1-0, or 2-0 container **grown** stock and following normal planting procedures. This should include control of competing vegetation. Spacing for windbreaks **is** 3 to 6 feet (90 to 180 cm.). Deer browse at the Plant Materials Center **has** not been a limiting factor.

Sources of Planting Stock: The USDA-Natural Resources Conservation Service, Rose Lake Plant Materials Center, 7472 Stoll Road, East Lansing, Michigan 48823, will maintain a cutting block of Leelanau Germplasm highbush cranberry. Hardwood cuttings and rooted cuttings will be made available to commercial producers.

References:

Gleason H. 1963. *The New Britton and Brown Illustrated Flora. Vol. 3.* New York: Hafner Publishing Company. 595 pp.

Voss, E. 1996. *Michigan Flora. Part III, dicots concluded.* Cranbrook Institute of Science Bulletin 61 and University of Michigan Herbarium. Ann Arbor, MI: Cranbrook Institute of Science. 622 pp.

Wyman D. 1970. *Shrubs and Vines for American Gardens.* New York: Macmillan Company. 613 pp.

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Table 1. Summary of *V. trilobum* survival and vigor during the 3-year initial trial period.

Accession	Survival (%)			Vigor				
	1985	1986	1987	6/4/85	8/21/85	8/19/86	6/3/87	7/30/87
9031898	100	90	90	2	4	3	3	3
9031899	100	100	100	3	5	4	3	3
9031900	100	100	100	3	5	4	3	3
9031901	100	100	100	3	5	5	3	3
9031902	100	100	90	4	5	5	4	4
9031903	100	100	90	3	5	5	3	3
9031904	80	60	60	4	6	7	4	4
9031905	100	100	90	3	6	4	4	4
9031906	100	100	80	3	5	4	3	3
9031907	100	90	80	3	4	4	3	3
9031908	90	90	80	3	5	3	3	3
9031909	100	100	100	3	5	3	3	3
9031910	100	100	100	3	5	3	2	2
9031911	100	100	100	3	5	3	2	2
9031912	100	100	100	3	4	3	2	2
9031913	100	100	100	3	5	3	3	3
9031914	90	99	80	3	5	5	3	3
9031856	100	80	80	2	5	5	4	4
9031857	100	100	100	3	5	3	3	3
9031858	90	80	80	3	5	4	4	4
9031859	100	100	100	2	4	3	2	2
9031860	100	100	100	2	4	3	2	2
9031861	100	100	100	2	4	3	1	1
9031862	100	100	100	3	5	3	3	3
9031863	100	100	90	3	4	2	1	1
9031864	100	100	100	3	5	3	2	2
9031865	100	100	100	3	5	3	2	2
9031866	100	100	100	2	4	3	2	2
9031867	100	100	100	2	4	3	2	2
9031868	100	100	90	2	4	3	2	2
9031869	100	100	90	4	5	3	3	3
9031870	100	100	100	3	5	3	3	3

Table 1(Continued).

Accession	Survival (%)			Vigor				
	1985	1986	1987	6/4/85	8/21/85	8/19/86	6/3/87	7/30/87
9031871	100	100	100	4	4	3	3	3
9031872	100	80	80	3	4	3	4	4
9031873	80	80	0	2	4	4	0	0
9031874	100	90	0	2	4	5	0	0
9031896	80	70	0	3	4	7	0	0
9031897	90	60	0	3	5	7	0	0
9031875	100	100	80	3	5	2	4	5
9031876	100	100	80	3	5	2	3	5
9031877	100	100	60	2	4	2	3	4
9031878	100	100	40	2	5	3	3	6
9031879	90	60	50	3	4	2	2	5
9031880	100	100	100	3	4	3	3	4
9031881	100	100	100	2	4	3	3	4
9031882	100	100	100	3	4	2	2	2
9031883	100	100	90	3	5	3	3	4
9031884	50	40	30	3	4	3	3	5
9031885	90	90	70	3	5	2	3	4
9031886	100	100	70	3	4	4	3	6
9031887	100	80	50	2	5	3	4	5
9031889	80	80	40	3	5	3	4	5
9031890	100	90	10	3	4	5	4	6
9031891	90	90	20	3	5	6	4	6
9031892	100	100	0	3	5	5	0	0
9031893	100	90	0	3	5	6	0	0
9031894	100	70	0	3	5	5	0	0
9031895	100	80	0	3	5	6	0	0

• vigor rating: 1=excellent, 3=good, 5=fair, **7=poor**, 9=very poor

Table 2. Summary of *V. trilobum* foliage abundance during the 3-year initial trial period and foliage densities during the final 2 years of the initial trial period.

Accession	Foliage Abundance			Foliage Density	
	1985	1986	1987	1986	1987
9031898	4	3	4	3	3
9031899	4	4	3	3	3
9031900	4	3	3	3	2
9031901	4	4	4	3	3
9031902	4	5	4	3	3
9031903	4	5	5	3	3
9031904	7	7	6	5	4
9031905	5	5	6	3	4
9031906	4	6	4	4	3
9031907	4	5	4	3	3
9031908	4	4	4	3	3
9031909	4	4	3	4	3
9031910	4	4	3	4	3
9031911	4	3	4	3	3
9031912	4	3	3	3	2
9031913	5	3	4	3	3
9031914	5	5	4	3	3
9031856	6	5	5	4	3
9031857	4	3	4	3	3
9031858	5	4	4	3	3
9031859	3	2	4	3	3
9031860	4	2	4	3	3
9031861	4	2	4	3	2
9031862	4	3	4	3	2
9031863	3	2	3	3	2
9031864	4	3	4	3	2
9031865	4	3	3	3	3
9031866	4	3	3	3	3
9031867	4	4	4	3	3
9031868	3	2	4	3	3
9031869	5	3	4	3	3

Table 2(Continued).

Accession	Foliage Abundance			Foliage Density	
	1985	1986	1987	1986	1987
9031870	4	3	4	3	3
9031871	4	2	4	3	3
9031872	6	5	5	4	4
9031873	4	4	0	3	0
9031874	5	5	0	4	0
9031896	5	7	0	4	0
9031897	5	6	0	4	0
9031875	3	2	5	3	3
9031876	4	2	5	3	3
9031877	4	3	5	3	3
9031878	5	3	6	3	4
9031879	3	2	5	3	4
9031880	3	2	4	3	3
9031881	3	2	4	3	3
9031882	4	2	3	3	3
9031883	5	3	4	3	3
9031884	3	3	5	3	3
9031885	5	4	5	3	3
9031886	4	4	5	3	3
9031887	4	4	6	3	4
9031889	4	3	6	3	4
9031890	4	5	6	3	4
9031891	4	4	6	3	4
9031892	4	5	0	3	0
9031893	4	5	0	3	0
9031894	4	5	0	3	0
9031895	4	5	0	3	0

- foliage abundance rating: 1=very abundant, 3=abundant, 5=moderate, **7=sparse**, 9= very sparse
- foliage density rating: 1=very dense, 3=dense, 5=moderate, 7= sparse, 9= very sparse

Table 3. Summary of *V. trilobum* plant heights and widths during the 3-year initial trial period.

Accession	Height (cm)				Width (cm)			
	at planting	1985	1986	1987	at planting	1985	1986	1987
903 1898	25	31	36	51	17	16	19	30
903 1899	38	42	45	78	19	25	27	55
903 1900	39	41	39	70	24	20	31	57
903 1901	36	37	33	45	16	18	21	40
903 1902	40	45	35	42	16	14	20	41
903 1903	42	48	41	46	22	18	26	43
903 1904	31	35	25	22	10	14	9	20
903 1905	29	35	27	35	15	11	19	35
903 1906	47	48	46	54	17	19	25	50
903 1907	39	42	39	50	14	15	19	37
903 1908	44	44	43	75	17	19	23	52
903 1909	49	46	53	81	26	20	39	66
903 1910	45	47	55	86	25	30	37	67
903 1911	43	46	45	77	18	14	26	54
903 1912	44	47	57	95	21	17	34	70
903 1913	48	50	53	93	25	28	31	54
903 1914	40	45	45	56	19	18	27	35
903 1856	44	40	44	50	16	20	13	23
903 1857	42	48	52	66	27	30	33	53
903 1858	39	40	43	62	15	14	25	43
903 1859	44	50	48	57	20	14	26	36
903 1860	40	38	47	56	16	14	24	35
903 1861	35	30	37	53	14	10	16	32
903 1862	36	40	44	69	19	18	29	58
903 1863	34	38	46	78	19	17	27	43
903 1864	44	44	51	61	15	16	21	38
903 1865	42	47	56	101	24	30	37	66
903 1866	45	45	45	59	15	14	18	35
903 1867	50	47	55	61	19	15	22	36
903 1868	44	38	46	54	19	17	21	32
903 1869	45	50	48	78	23	15	24	58
903 1870	48	51	53	69	30	24	35	56

Table 3 (continued).

Accession	Height (cm)				Width (cm)			
	at planting	1985	1986	1987	at planting	1985	1986	1987
9031871	48	49	50	66	31	22	35	44
9031872	41	44	31	38	10	10	8	11
9031873	38	37	30	0	16	14	16	0
9031874	39	40	30	0	10	8	12	0
9031896	24	17	14	0	11	10	8	0
9031897	26	14	15	0	13	8	12	0
9031875	45	47	40	64	22	20	33	23
9031876	45	42	40	65	18	14	24	20
9031877	45	50	40	63	16	10	23	32
9031878	46	45	36	46	16	10	15	25
9031879	22	33	34	49	11	10	20	23
9031880	24	30	36	51	14	10	18	28
9031881	40	36	47	61	17	10	18	29
9031882	44	40	67	97	25	23	40	58
9031883	45	43	50	62	17	8	18	26
9031884	27	21	51	61	14	10	16	28
9031885	27	24	35	50	14	8	13	20
9031886	27	24	33	43	15	8	13	19
9031887	24	21	22	39	16	10	13	18
9031889	25	23	26	40	14	11	17	20
9031890	23	23	15	47	12	8	10	26
9031891	25	23	13	39	15	8	13	21
9031892	25	21	10	0	16	8	12	0
9031893	27	25	9	0	13	8	8	0
9031894	24	23	15	0	14	10	11	0
9031895	25	26	8	0	13	8	7	0

Table 4. Summary of *V. trilobum* insect and disease resistance during the 3-year initial trial period.

Accession	Insect Resistance			Disease Resistance		
	1985	1986	1987	1985	1986	1987
903 1898	2	2	3	2	1	1
903 1899	2	2	1	2	1	1
903 1900	2	2	1	2	1	1
903 1901	2	2	1	2	1	1
903 1902	2	2	2	2	1	1
903 1903	2	2	2	2	1	1
903 1904	2	2	2	2	1	1
903 1905	2	2	2	2	1	1
903 1906	2	3	2	2	1	1
903 1907	2	3	2	2	1	1
903 1908	2	2	2	2	1	1
903 1909	2	2	2	2	1	1
903 1910	2	2	2	2	1	1
903 1911	2	2	2	2	1	1
903 1912	2	2	2	2	1	1
903 1913	2	2	2	2	1	1
903 1914	2	2	2	2	1	1
903 1856	2	2	2	2	1	1
903 1857	2	2	2	2	1	1
903 1858	2	2	2	2	1	1
903 1859	2	2	2	2	1	1
903 1860	2	2	2	2	1	1
903 1861	2	3	2	2	1	1
903 1862	2	2	2	2	1	1
903 1863	2	2	2	2	1	1
903 1864	2	2	2	2	1	1
903 1865	2	2	2	2	1	1
903 1866	2	2	2	2	1	1
903 1867	2	3	2	2	1	1
903 1868	2	2	2	2	1	1
903 1869	2	2	2	2	1	1
903 1870	2	3	2	2	1	1

Table 4 (continued),

Accession	Insect Resistance			Disease Resistance		
	1985	1986	1987	1985	1986	1987
9031871	2	2	2	2	1	1
9031872	2	2	2	2	1	1
9031873	2	2	0	2	1	0
9031874	2	3	0	2	1	0
9031896	2	2	0	2	1	0
9031897	2	2	0	2	1	0
9031875	2	2	4	2	1	1
9031876	2	2	3	2	1	1
9031877	2	2	4	2	1	1
9031878	2	2	3	2	1	1
9031879	2	2	4	2	1	1
9031880	2	2	3	2	1	1
9031881	2	3	3	2	1	1
9031882	2	2	2	2	1	1
9031883	2	3	3	2	1	1
9031884	2	2	3	2	1	1
9031885	2	2	3	2	1	1
9031886	2	2	3	2	1	1
9031887	2	2	3	2	1	1
9031889	2	2	3	2	1	1
9031890	2	2	3	2	1	1
9031891	2	2	3	2	1	1
9031892	2	2	0	2	1	0
9031893	2	2	0	2	1	0
9031894	2	2	0	2	1	0
9031895	2	2	0	2	1	0

- insect/disease resistance rating: 1= no detectable damage, 3=slight damage, 5=moderate damage, 7=severe damage, 9= nearly complete defoliation

Table 5. Summary of *V. trilobum* survival during the 5-year advanced trial period.

Accession	Survival (%)				
	1988	1989	1990	1991	1992
9031863	100	90	90	90	90
9031870	60	60	60	60	60
9031881	50	50	50	50	50

Table 6. Summary of *V. trilobum* vigor during the 5-year advanced trial period.

Accession	Vigor									
	6/27/88	8/31/88	5/24/89	7/13/89	6/13/91	6/4/91	7/31/91	10/16/91	5/27/92	7/28/92
9031863	3	3	3	1	3	2	2	3	2	2
9031870	5	5	3	2	3	3	2	3	2	2
9031881	4	4	3	2	3	3	3	8	3	4

- vigor rating: 1=excellent, 3=good, 5=fair, **7=poor**, 9=very poor

Table 7. Summary of *V. trilobum* foliage abundance during the 5-year advanced trial period and foliage densities during the initial 2 years of the advanced trial period.

Accession	Foliage Abundance					Foliage Density	
	1988	1989	1990	1991	1992	1988	1989
9031863	3	2	2	2	3	2	2
9031870	6	2	2	3	3	3	3
9031881	5	2	3	3	4	3	3

- foliage abundance rating: **1=very abundant**, 3=abundant, 5=moderate, **7=sparse**, 9= very sparse
- foliage density rating: 1=very **dense**, 3=**dense**, 5=**moderate**, 7= **sparse**, 9= very sparse

Table 8. Summary of *V. trilobum* plant heights and widths during the initial 2 years of the advanced trial period.

Accession	Height (cm)		Width (cm)	
	1988	1989	1988	1989
9031863	61	110	41	70
9031870	66	90	51	80
9031881	61	85	25	40

Table 9. Summary of *V. trilobum* insect and disease resistance during the 5-year advanced trial period and drought tolerance during the initial year of advanced trial period.

Accession	Insect Resistance				Disease Resistance				Drought Tolerance
	1988	1989	1990	1991	1988	1989	1990	1991	1988
9031863	2	2	2	3	1	1	2	1	4
9031870	2	2	2	2	1	1	2	1	6
9031881	2	2	2	2	1	1	3	1	7

- insect/disease resistance rating: 1=no detectable damage, 3=slight damage, 5=moderate damage, 7=severe damage, 9= nearly complete defoliation
- drought tolerance rating: 1=excellent tolerance, 3=good tolerance, 5=moderant tolerance, 7=slight tolerance, 9=no tolerance

Table 10. Summary of *V. trilobum* bloom dates during the 5-year advanced trial period and spring recovery dates during the initial and final years of the advanced trial period,

Accession	Spring Recovery		Bloom Date (mm/dd/yy)				
	Date (mm/dd/yy)		1988	1989	1990	1991	1992
9031863	5/6/88	4/25/92	none	none	none	none	5/27/92
9031870	5/9/88	4/20/92	6/1/88	5/25/89	6/5/90	6/10/91	5/27/92
9031881	5/9/88	4/25/92	none	none	none	none	none

Table 11. Summary of *V. trilobum* hardwood production during the 5-year advanced trial period.

Accession	Cuttings Planted (No.)			Survival (%)			
	1992	1993	1994	1992	1993	1994	Average
9031863	265	251	200	68	24	39	51
9031870	370	250	200	78	0	0	35
9031881	52	70	200	98	20	11	27