Natural History of Hokkaido as revealed in soils

Re-edited for 2019, Part 2

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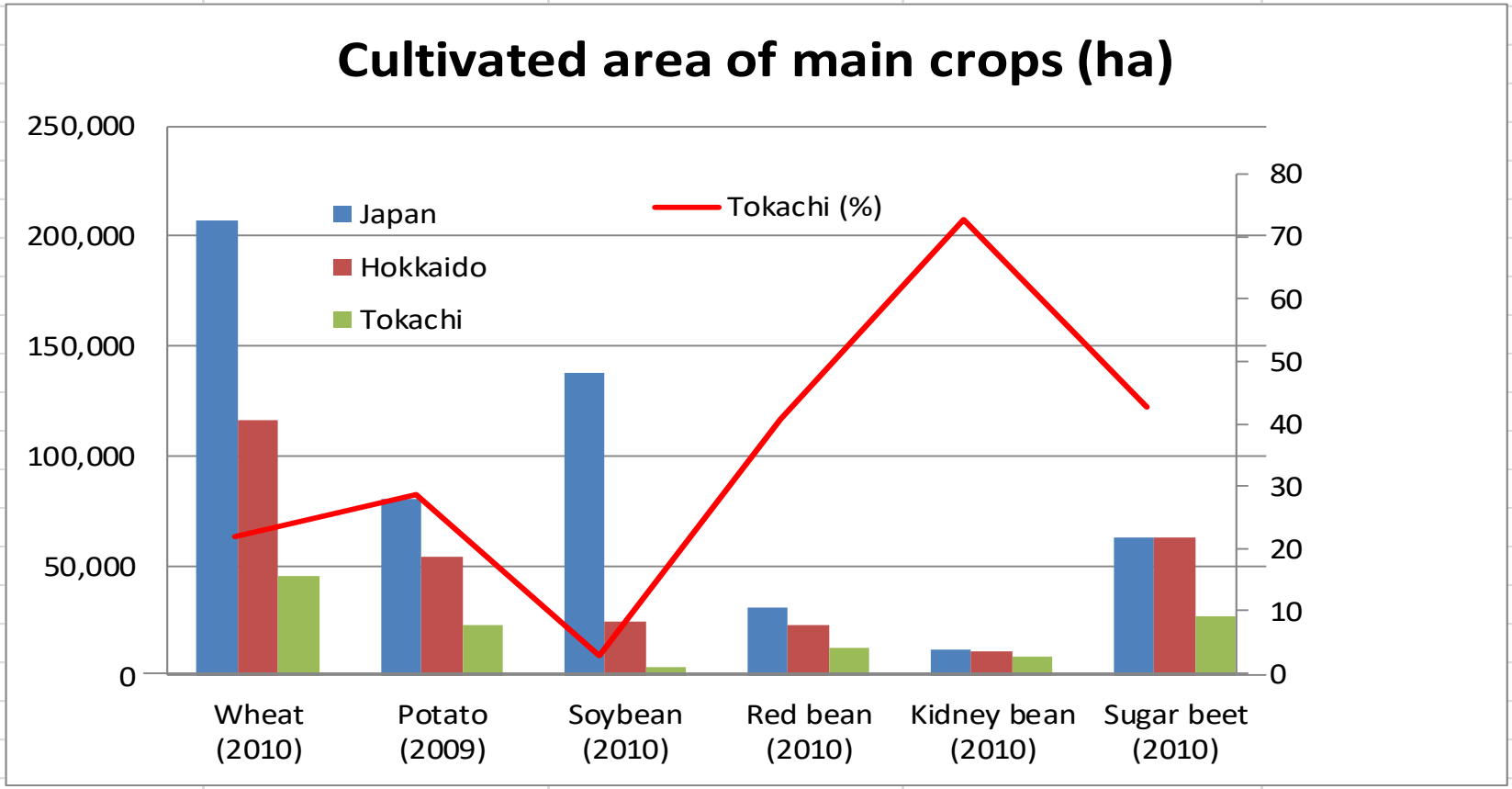
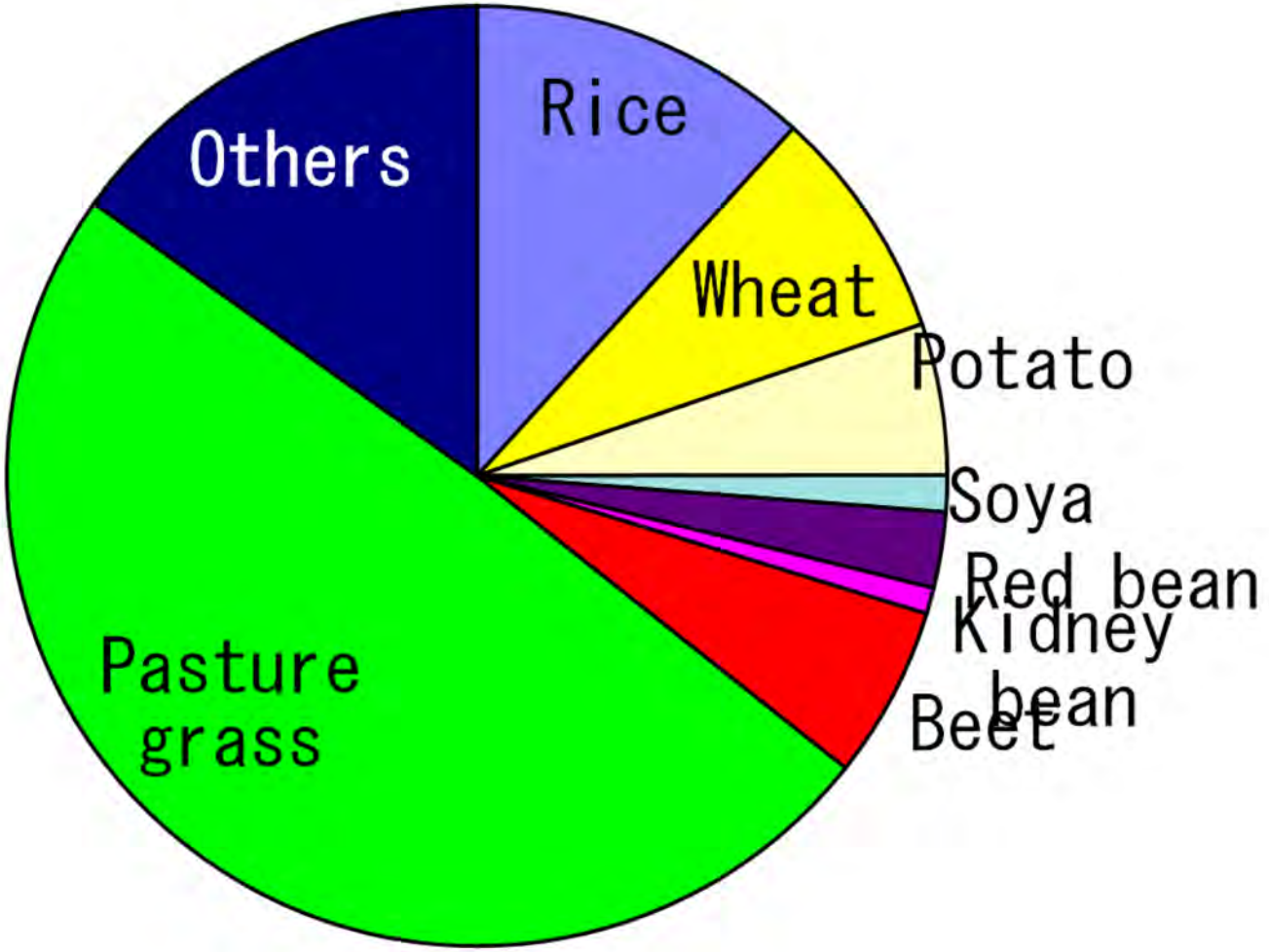
Agriculture in Tokachi
History and present situation

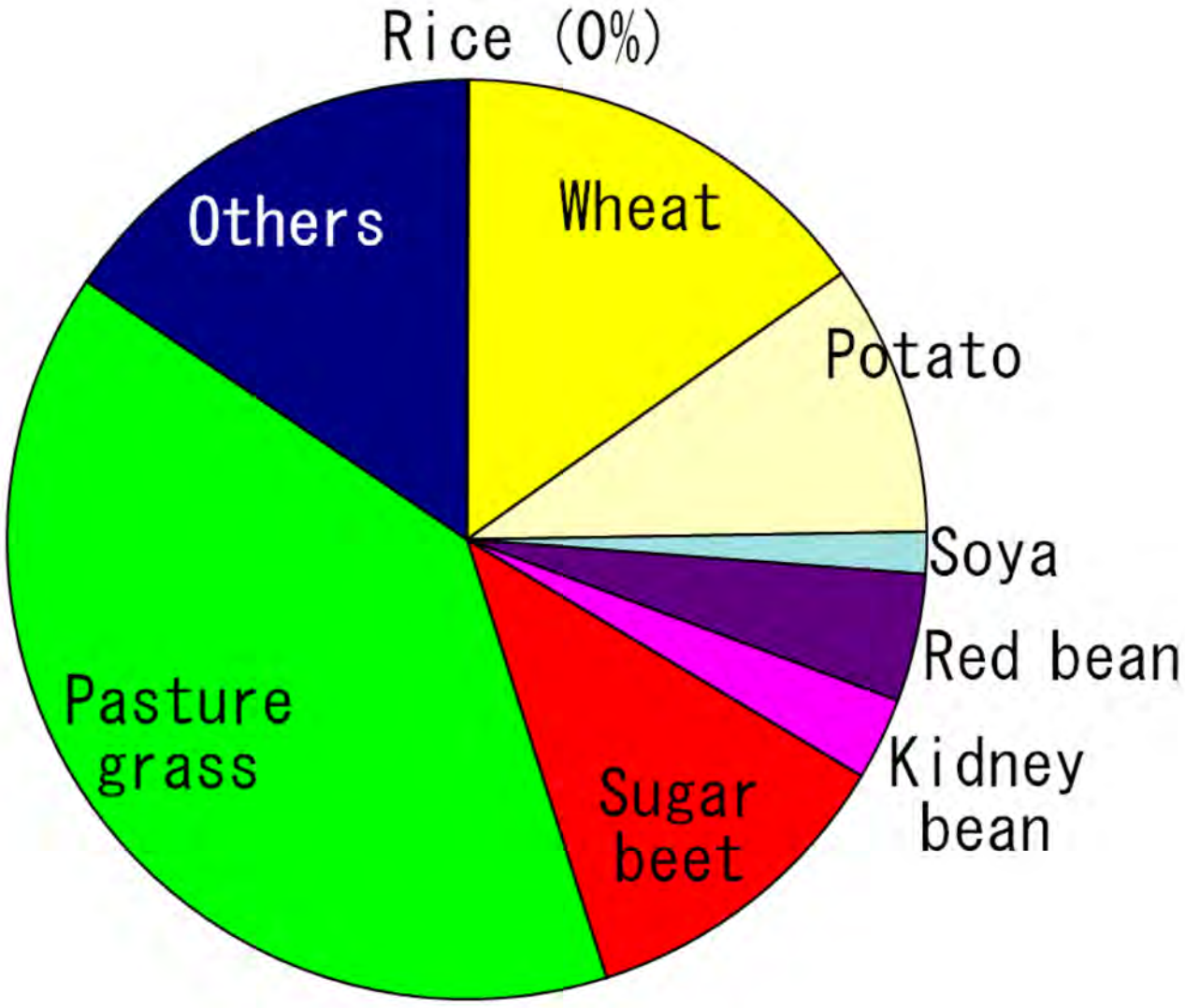
Cultivated area of main crops in Japan, Hokkaido, and Tokachi



Area of main crops (Hokkaido)

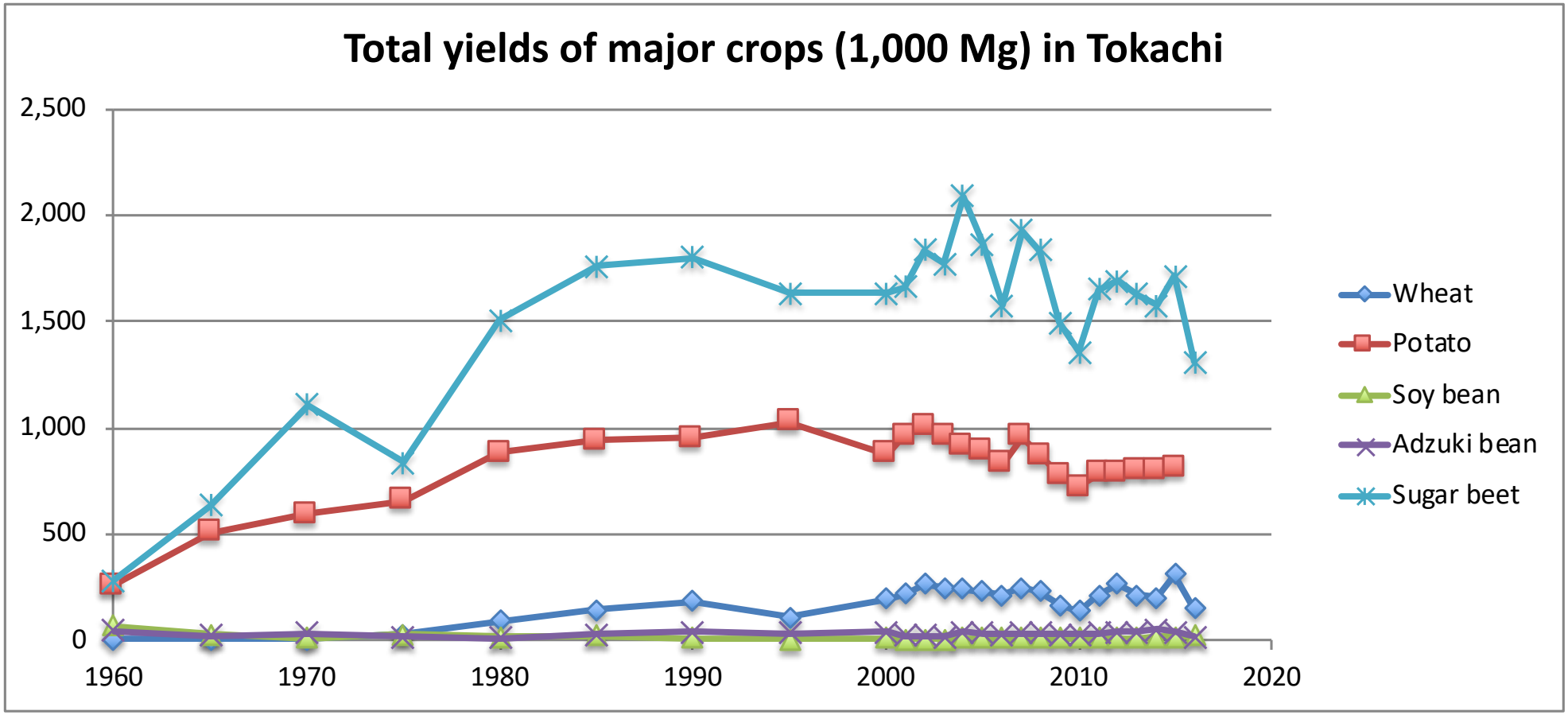


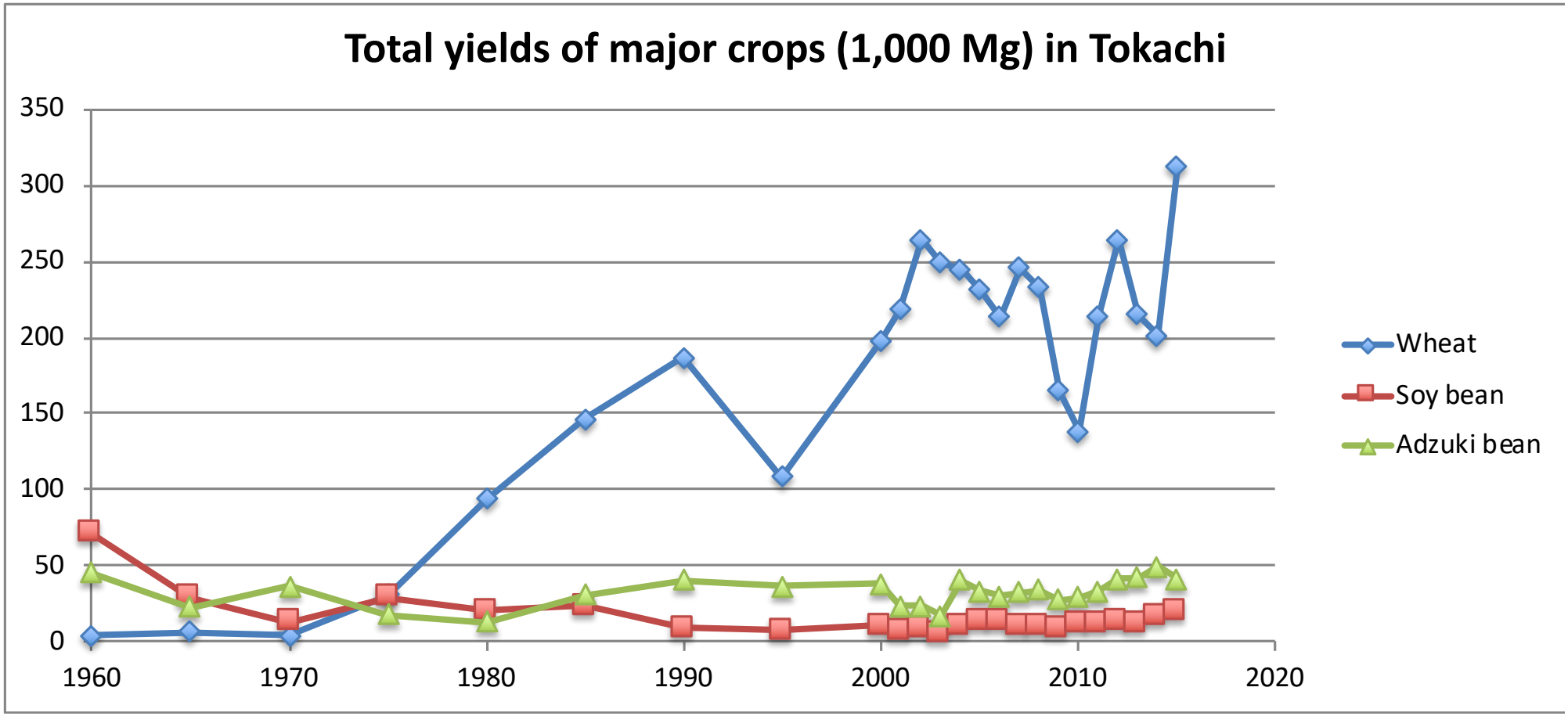
Area of main crops
(Tokachi)

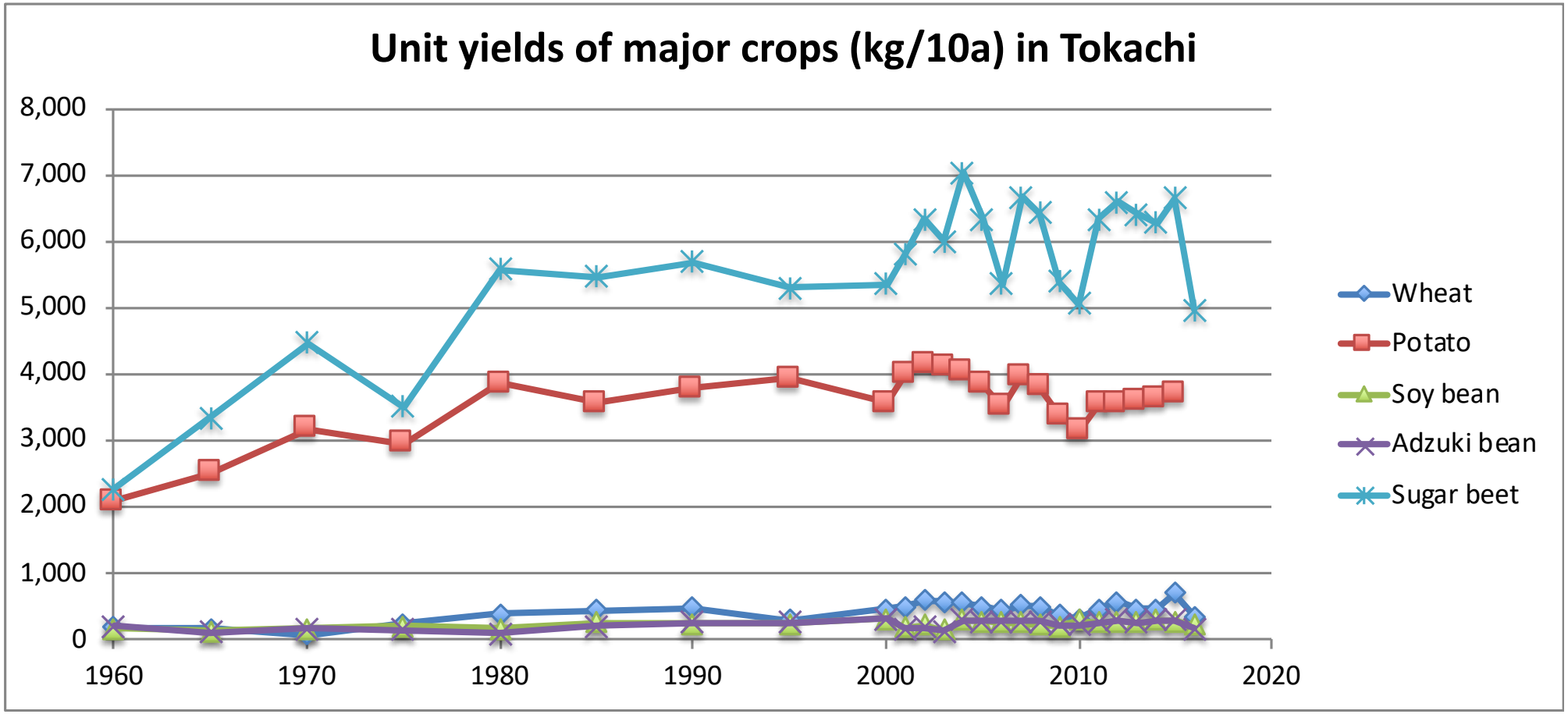


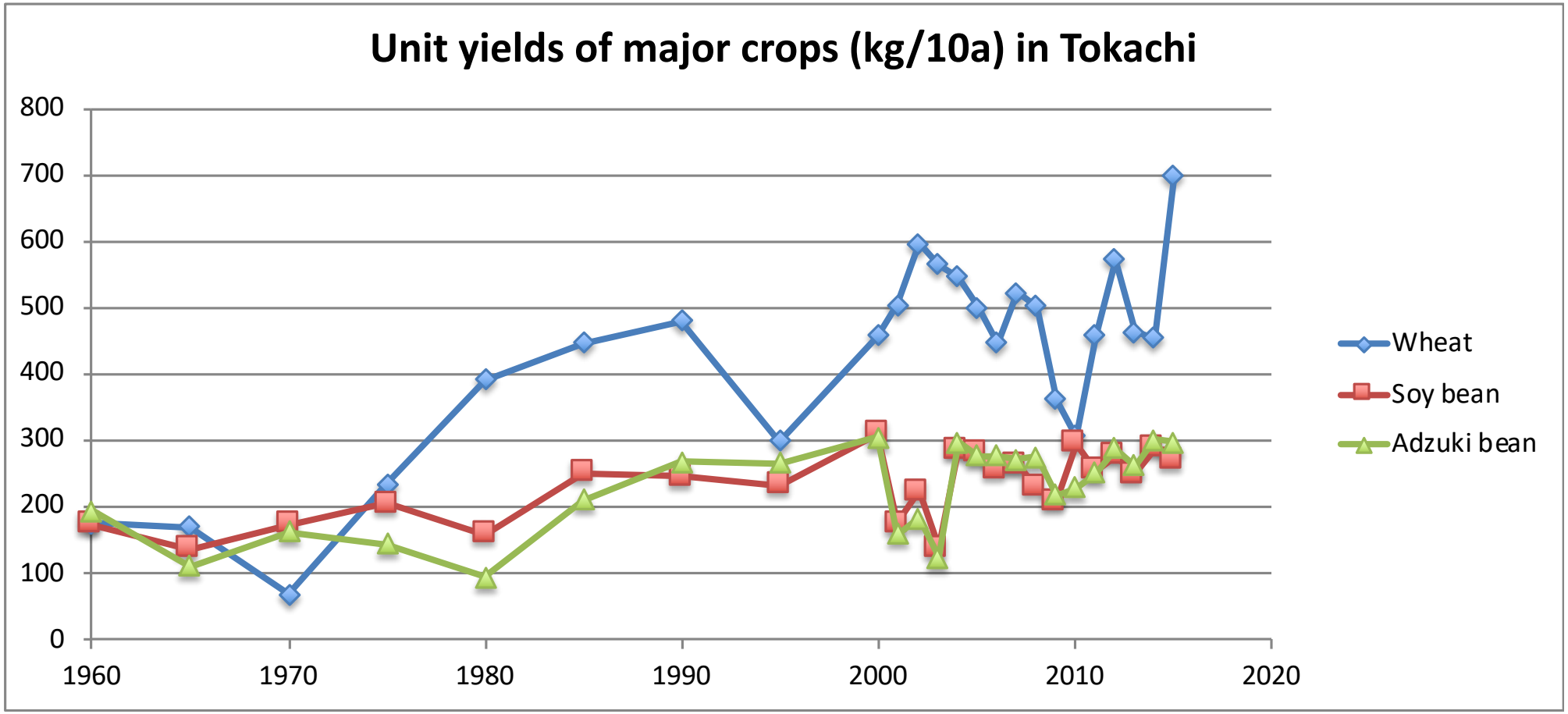
Comparison of Agricultural Production between Japan, Hokkaido, and Tokachi (2016)

	unit	Japan	Hokkaido	Tokachi	Tokachi/Japan(%)
Wheat	1000 Mg	790.8	524.3	151.4	19.1
Potato	1000 Mg	2406	1907	805.8	33.5
Sugar beet	1000 Mg	3189	3189	1308	41.0
Soy bean	1000 Mg	238	84.4	22.4	9.4
Adzuki bean	1000 Mg	29.5	27.1	17.9	60.7
Kidney bean	1000 Mg	5.65	5.48	4.12	72.9
Cow milk	1000 Mg	7394	3923	1150	15.6
Beef cow	1000 Head	2274	491	224.6	9.9


Total yields of major crops (1,000 Mg) in Tokachi
2,500
2,000
1,500
1,000
500
0
1960
1970
1980
1990
2000
2010
2020
Wheat
Potato
Soy bean
Adzuki bean
Sugar beet


Total yields of major crops (1,000 Mg) in Tokachi
350
300
250
200
150
100
50
0
1960
1970
1980
1990
2000
2010
2020
Wheat
Soy bean
Adzuki bean


Unit yields of major crops (kg/10a) in Tokachi
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1960
1970
1980
1990
2000
2010
2020
Wheat
Potato
Soy bean
Adzuki bean
Sugar beet


Unit yields of major crops (kg/10a) in Tokachi
800
700
600
500
400
300
200
100
0
1960
1970
1980
1990
2000
2010
2020
Wheat
Soy bean
Adzuki bean

Contribution to sugar-beet production

- Introduction of paper pot transplanting technique
- Land improvement (amelioration of soil acidity, drainage of land)
- High yielding variety

Contribution to red bean (Azuki) production

- High yielding variety
  (Erimo variety since 1981)
- High income for farmers
- Special product of Tokachi

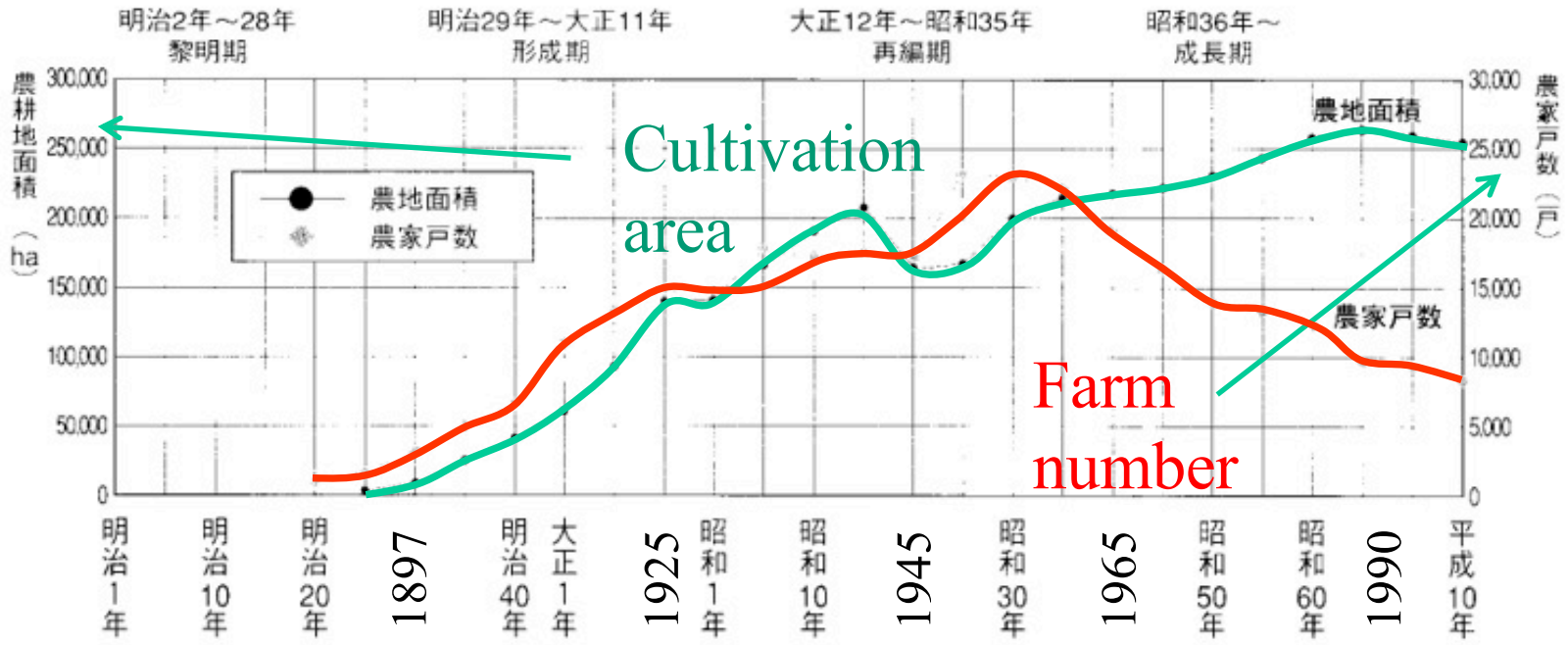
due to high quality

Rice ball coated with sweet Azukibean paste.

Contribution to wheat production

- Agricultural policy to support wheat production
- High yielding variety (Chihoku, Hokushin)
- Low labor input

Number and cultivation area of farms in Tokachi



図－1　十勝管内における農家戸数と農耕地面積の推移

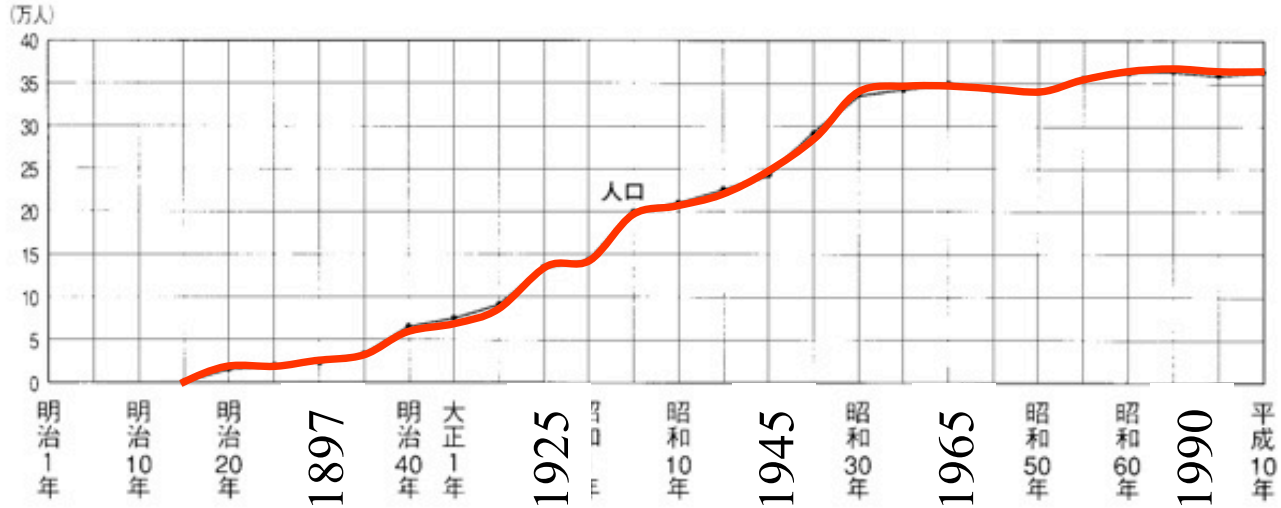
Why agricultural population decreased in Tokachi?

- Merit of large scale operation of agriculture
- Outflow of labor force to industrial, commercial, and civil service

Population change in Tokachi

400,000

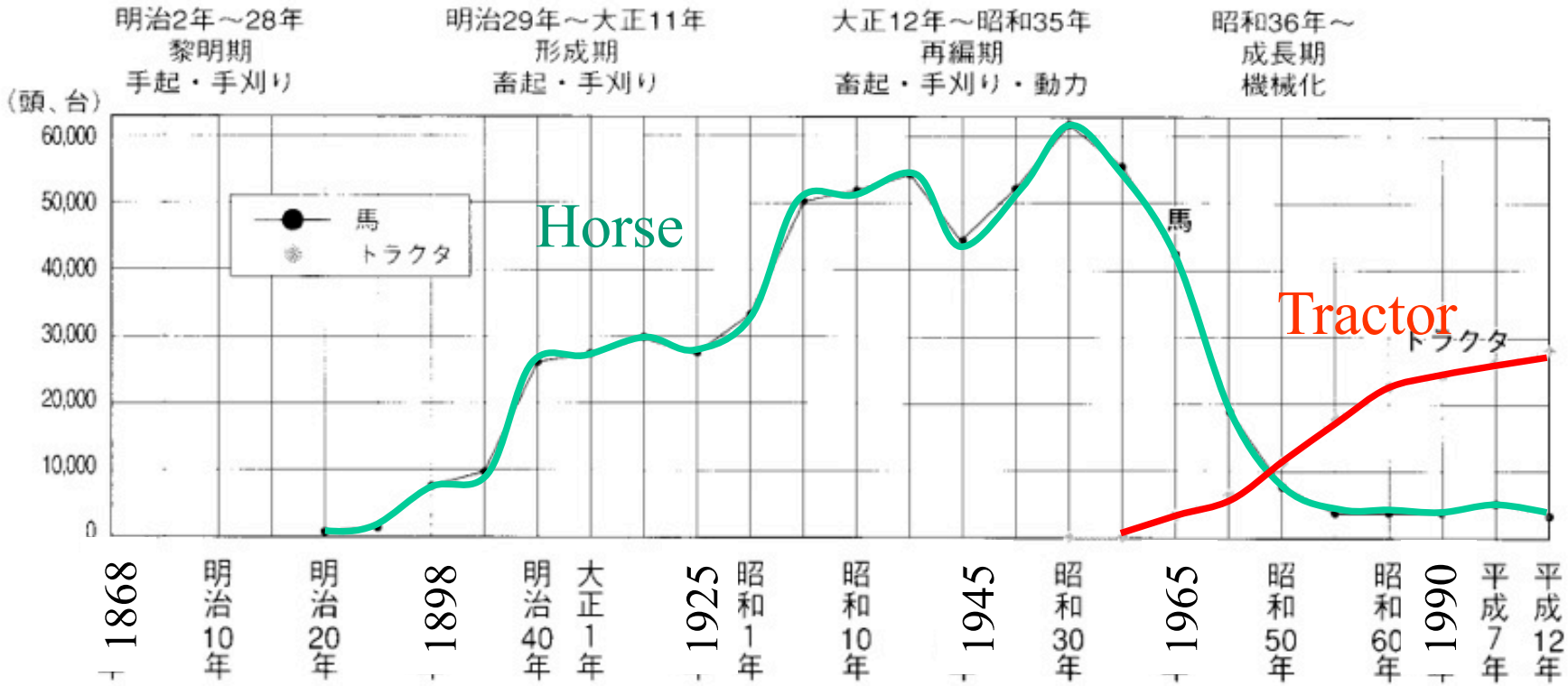
200,000



360,000

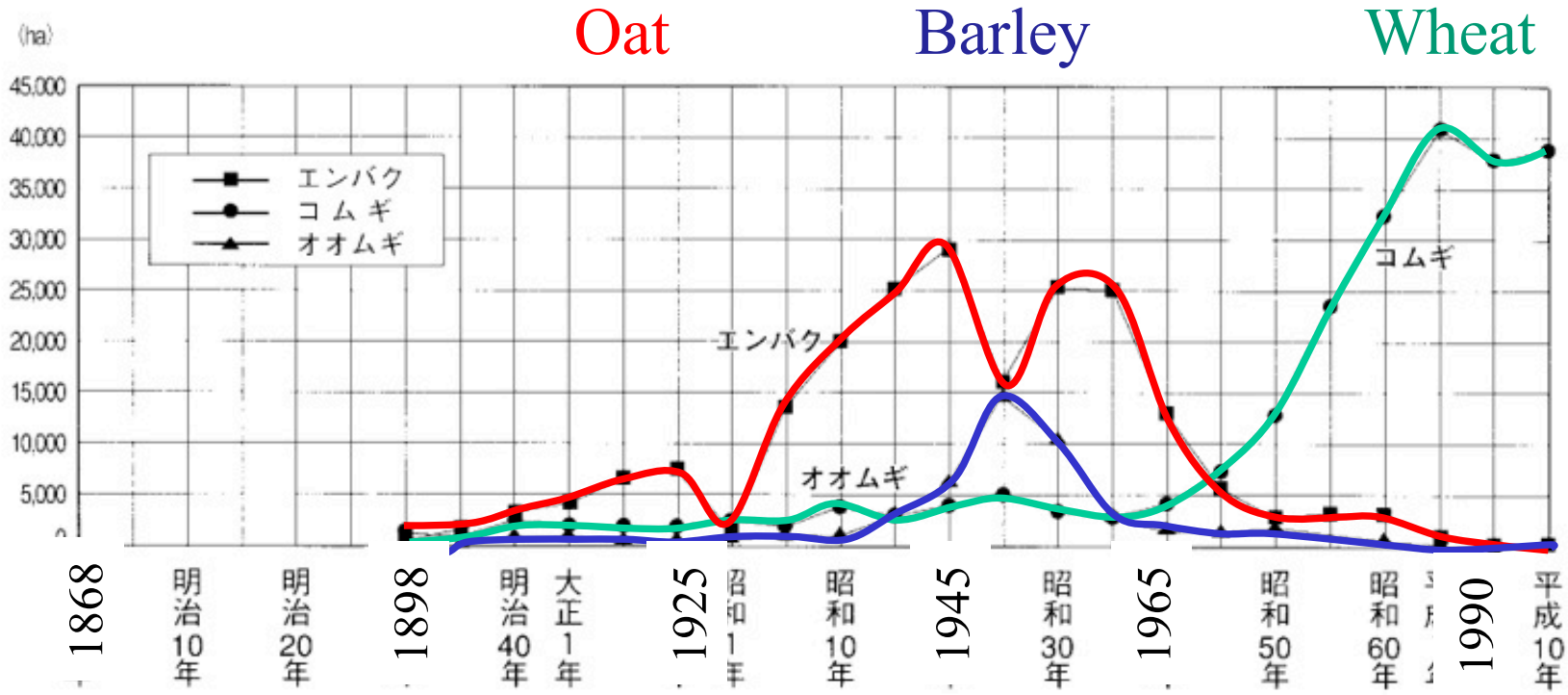
図－2　十勝管内における人口の推移

Number of horse and tractors in Tokachi



図－3　十勝管内における馬の頭数・トラクタの台数および作業形態の推移

Area of wheat, barley, oat in Tokachi



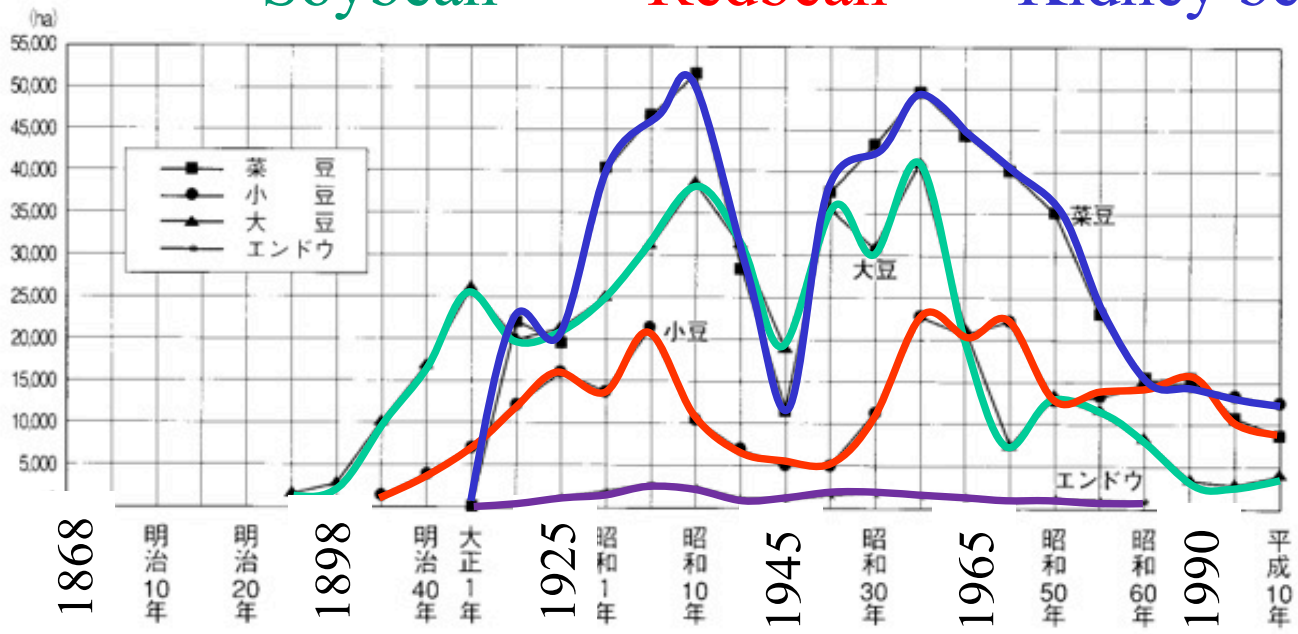
図－6　十勝管内におけるムギ類の作付面積の推移

Why oat and barley decreased

- Oat and barley had been used as forage of horses.
- Horses for plowing were replaced by tractors.

Cultivated area of pulses in Tokachi

Soybean Redbean Kidney bean



図－5　十勝管内におけるマメ類の作付面積の推移

Green peas

Why soybean decreased

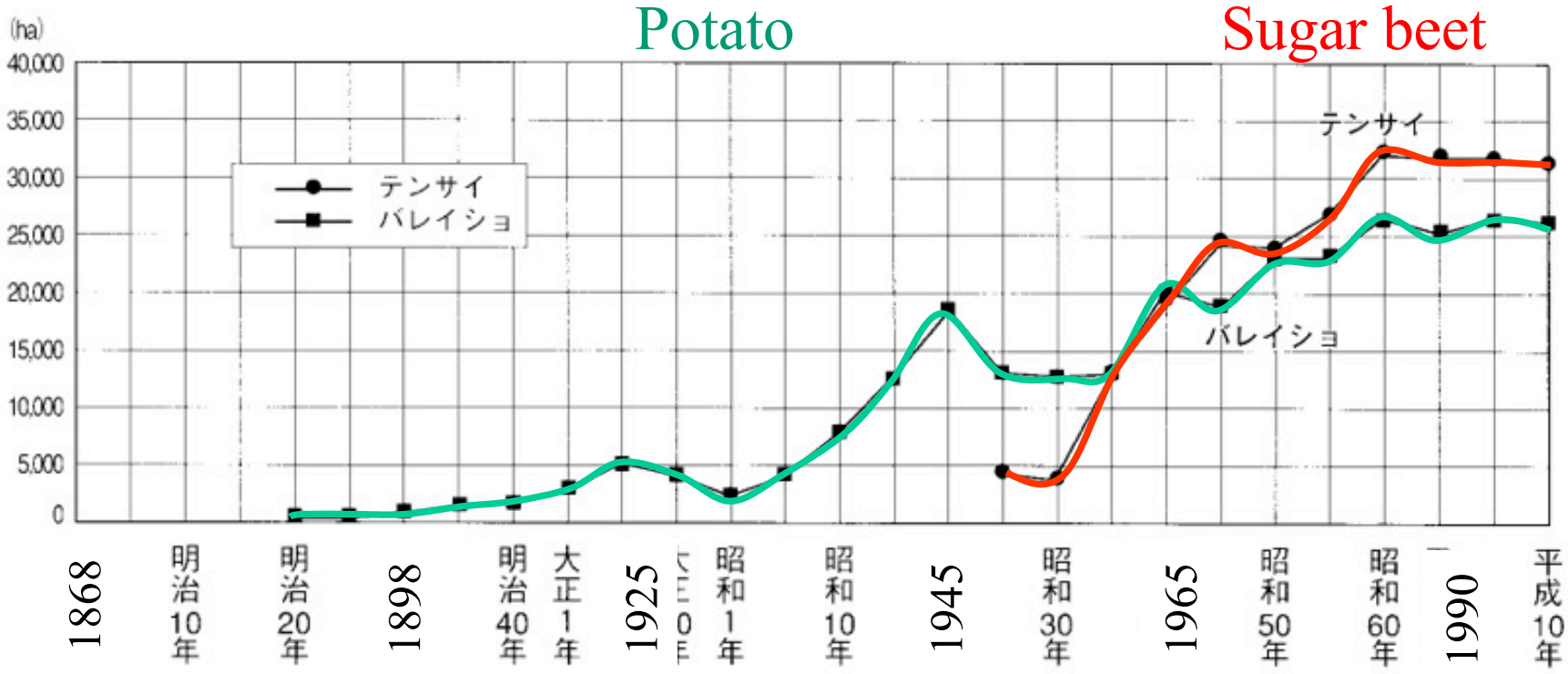
- Due to low international price.
- Import is freed and cheap soybean is imported from USA and South America
- Only special good variety can survive in Tokachi

Redbean (Azuki bean)

Kidney bean

Soybean

Area of Sugar-beet and potato cultivation in Tokachi

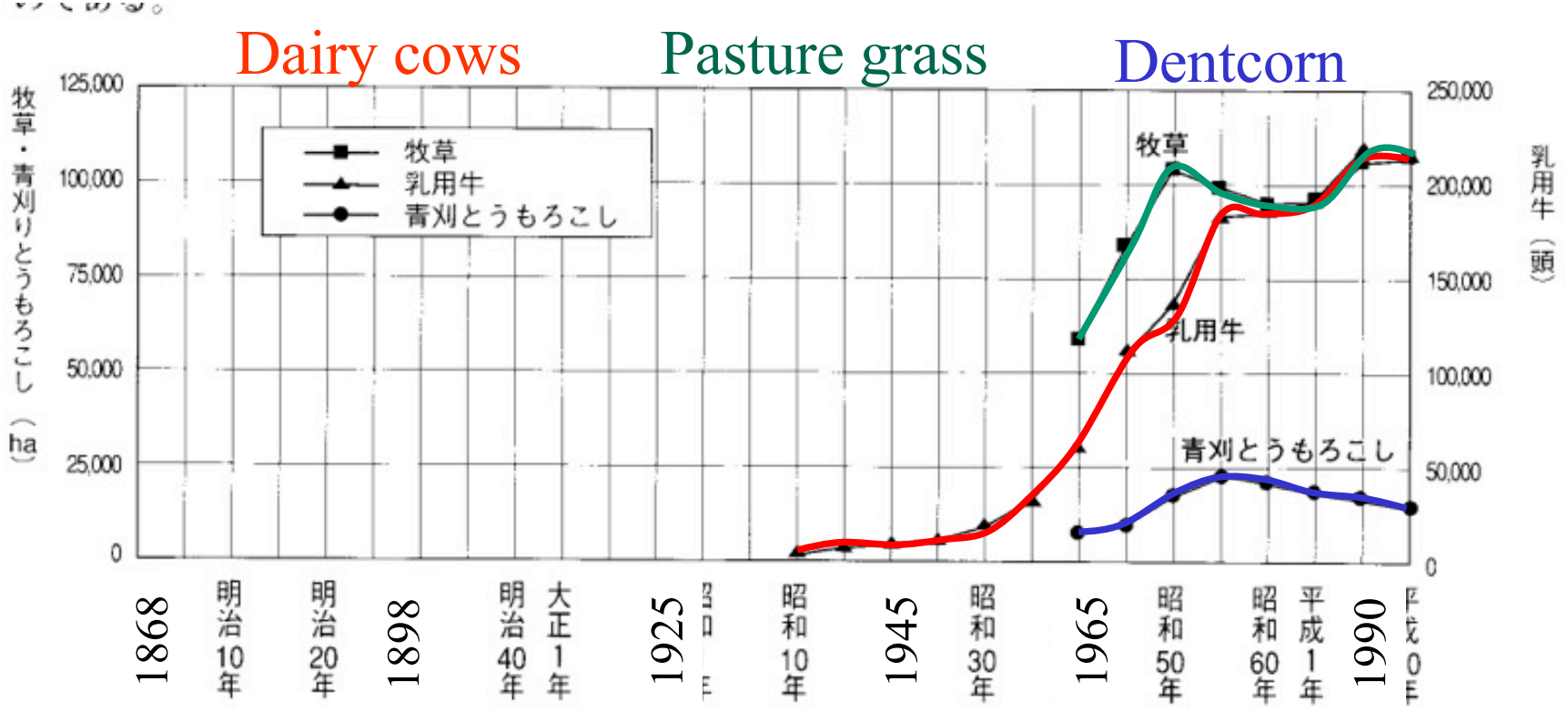


図―7　十勝管内におけるテンサイおよびバレイショの作付面積の推移

Sugar beet

Potato (May Queen)

Number of Dairy cows and area of pasture in Tokachi



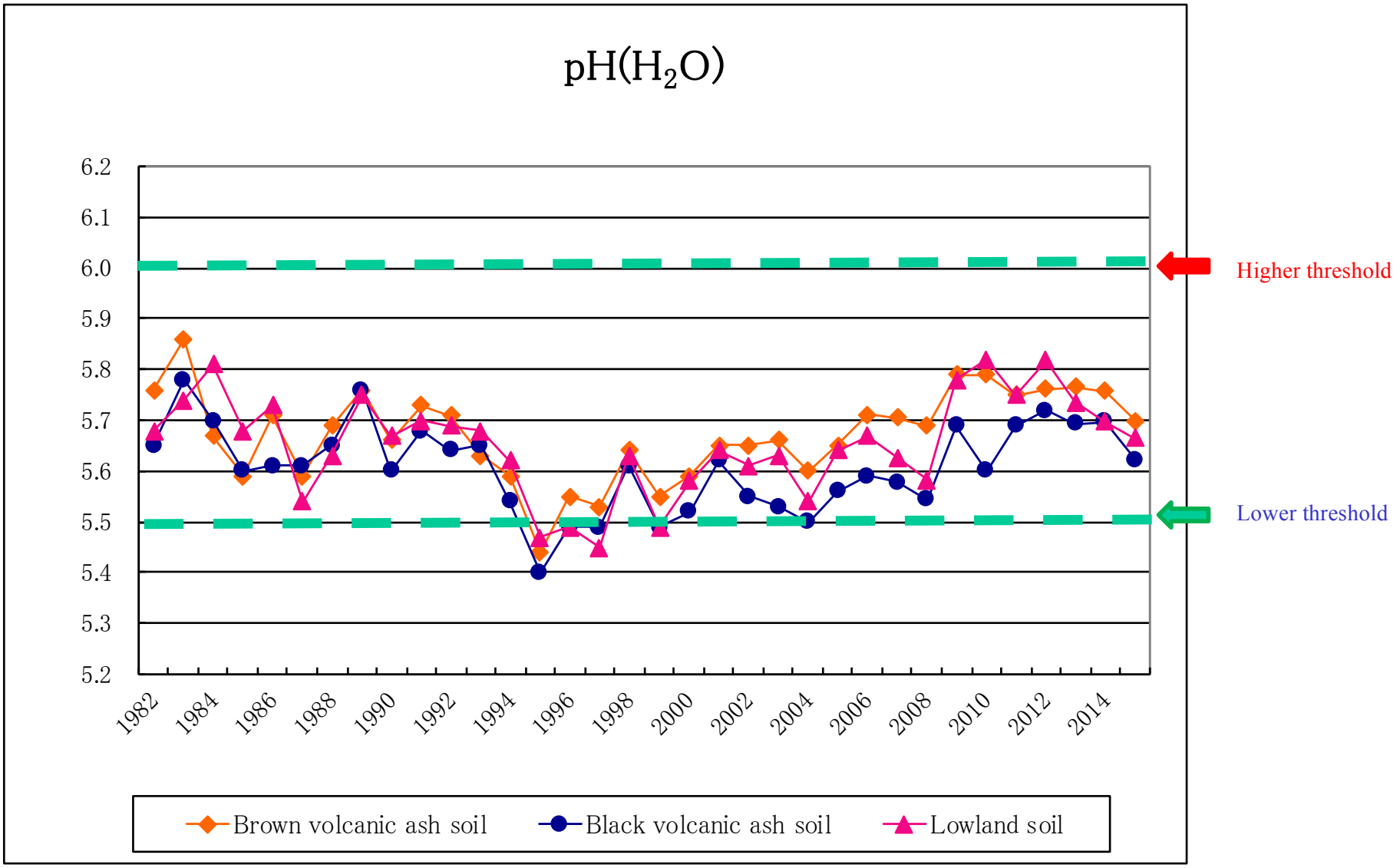
図－8　十勝管内における乳牛頭数・牧草地・青刈りとうもろこしの作付面積の推移

Dairy cow and pasture

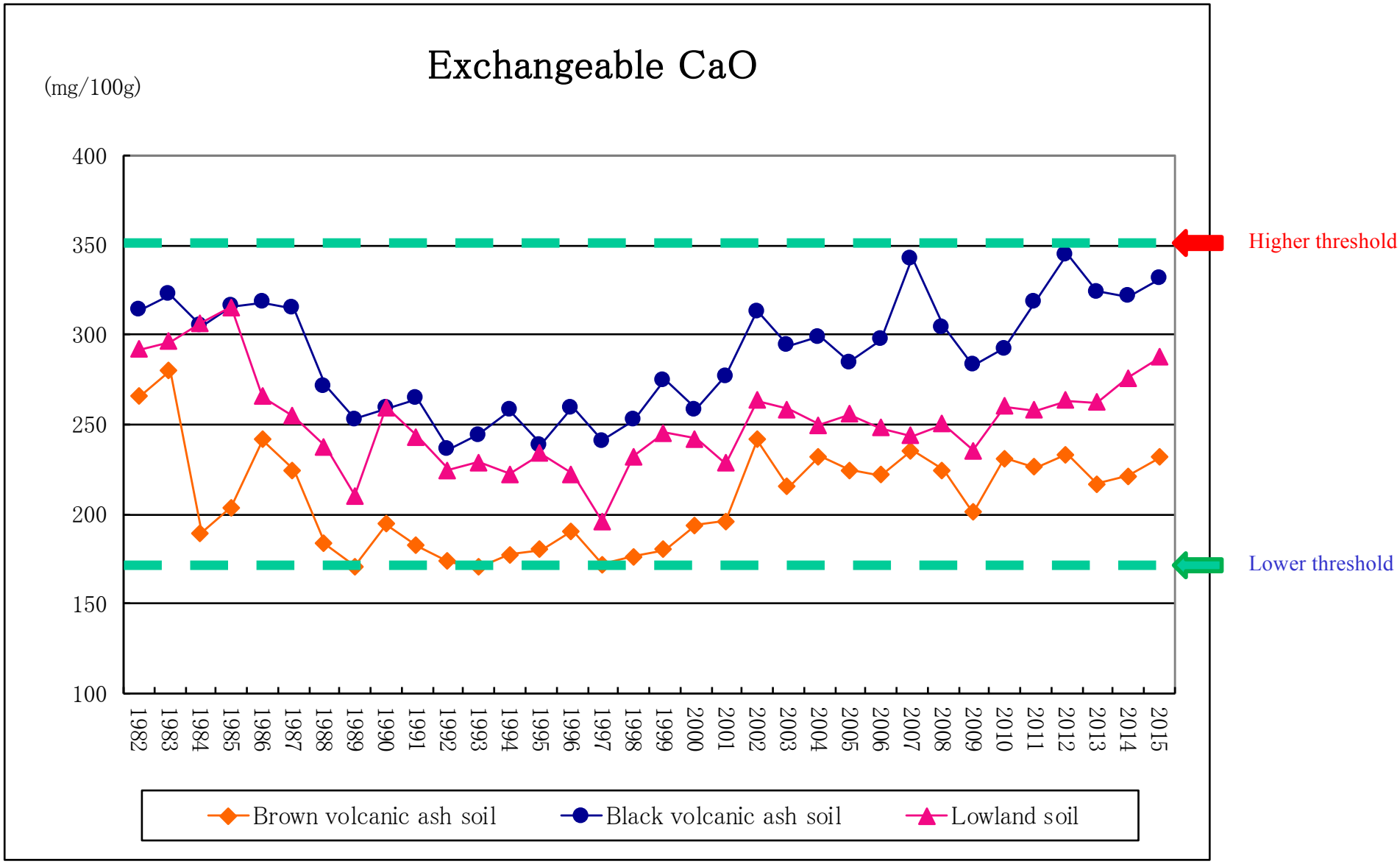
Farm of Obihiro Univ. A. V. M.

Various problems for soils in Tokachi

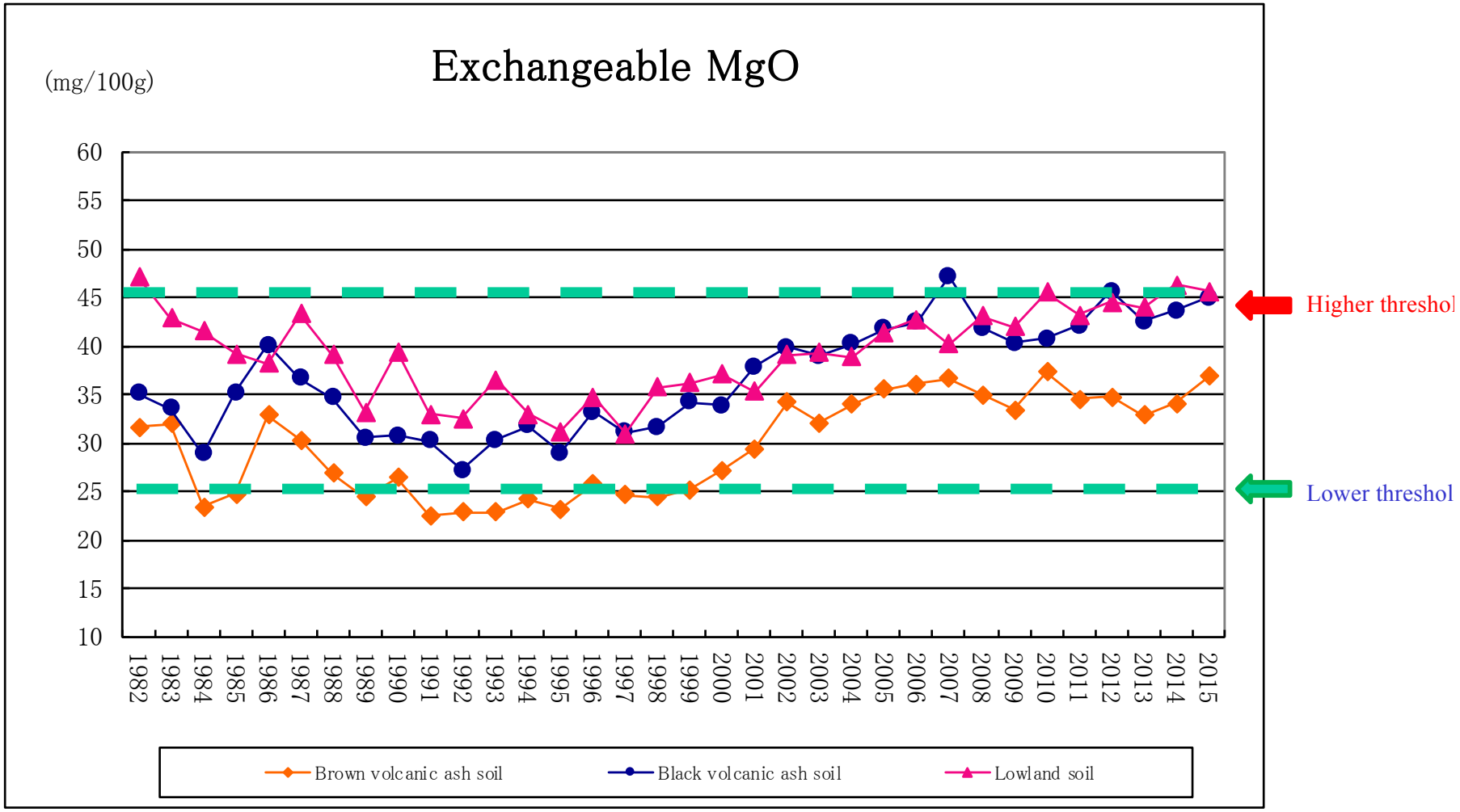
- Decreasing soil pH
- Imbalance in soil nutrition (Excess P_2O_5, decrease in Ca, Mg)
- Micronutrient deficiency (Cu, Zn, Mn, B)
- Deterioration of soil physical properties
- Soil erosion
- Water and land pollution by animal wastes



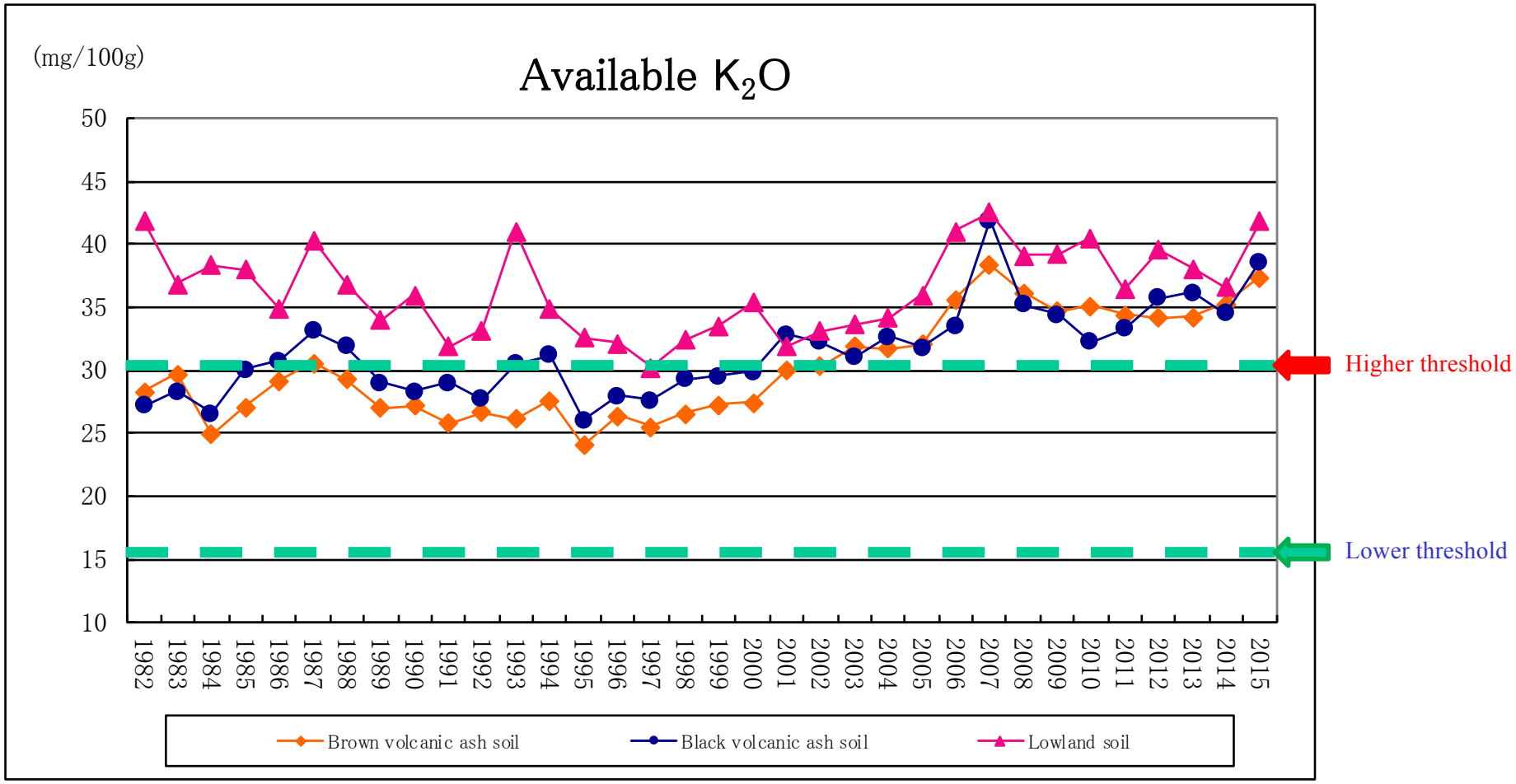
Change in soil pH in Tokachi; normal Andosoils, wet Andosoils, and lowland soils. Data: Tokachi Federation of Agricultural Co-operatives.



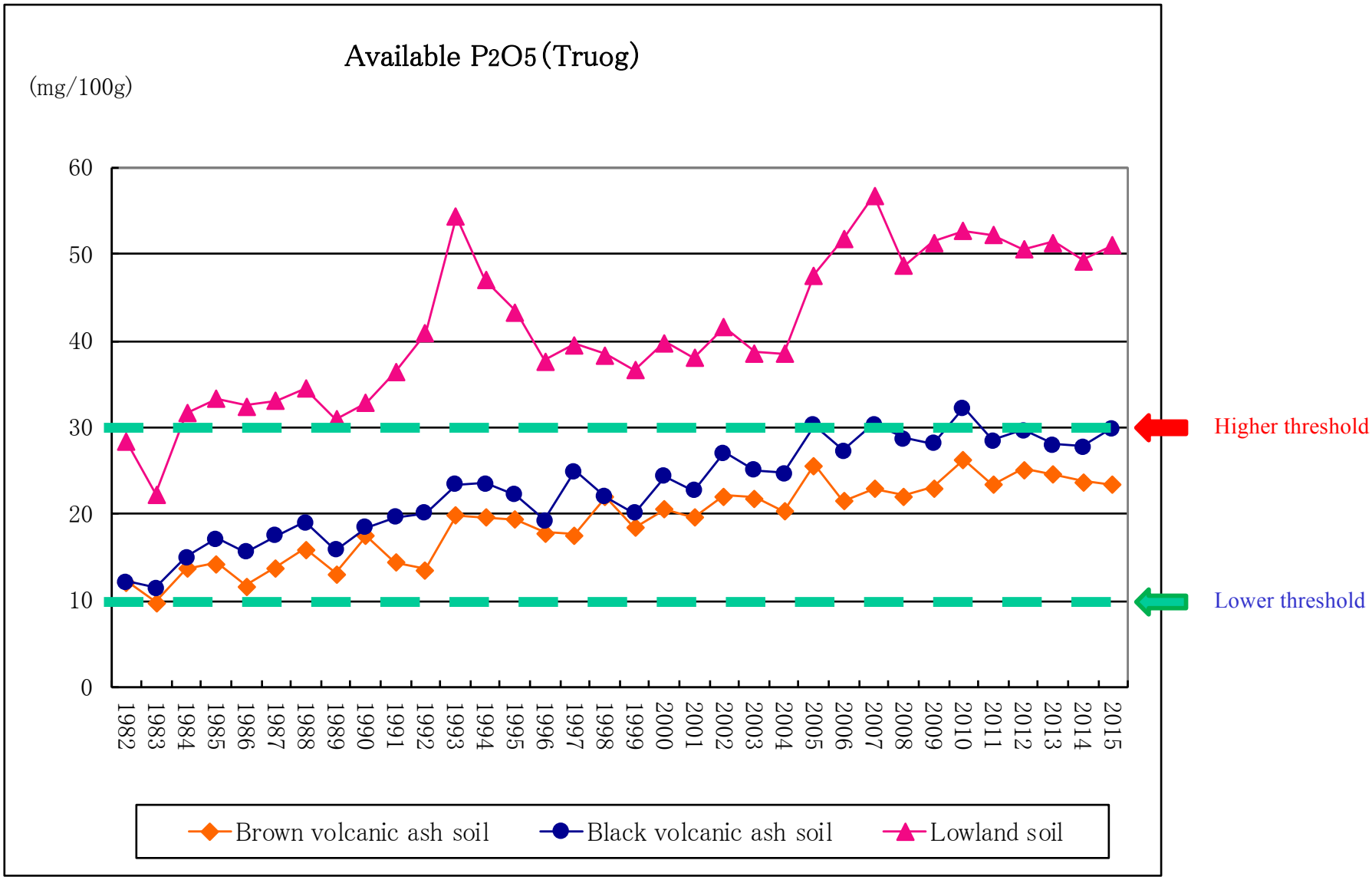
Change in exchangeable CaO in Tokachi; normal Andosoils, wet Andosoils, and lowland soils. Data: Tokachi Federation of Agricultural Co-operatives.



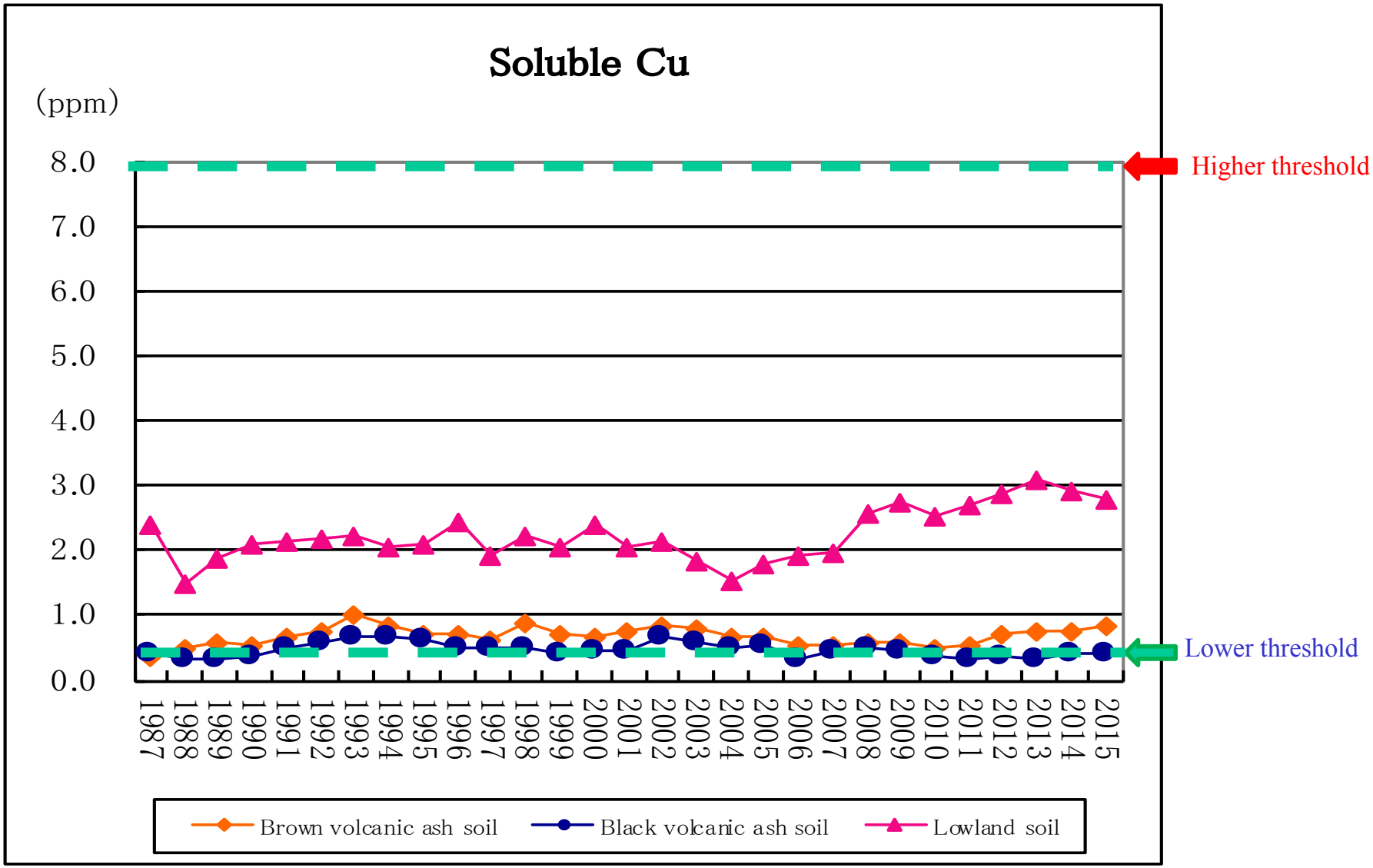
Change in exchangeable MgO in Tokachi; normal Andosoils, wet Andosoils, and lowland soils. Data: Tokachi Federation of Agricultural Co-operatives.



Change in exchangeable K_2O in Tokachi; normal Andosoils, wet Andosoils, and lowland soils. Data: Tokachi Federation of Agricultural Co-operatives.



Change in available P_2O_5 in Tokachi; normal Andosoils, wet Andosoils, and lowland soils. Data: Tokachi Federation of Agricultural Co-operatives.



Change in soluble Cu in Tokachi; normal Andosoils, wet Andosoils, and lowland soils. Data: Tokachi Federation of Agricultural Co-operatives.

Problems of volcanic ash soils

- Strong acidity
- Poisnous active aluminium
- High phosphate absorption and low availale phosphate
- Low in nitrogen and bases
- Soil drying in normal Kuroboku soil
- Wet damage in wet type Kuroboku soil

Merit of volcanic ash soils

- Soils are soft and easily plowed
- Humus holds exchangeable bases

How to improve volcanic ash soils

- Soil survey and soil diagnosis help decide the goals and methods of soil improvement
- Amelioration of soil acidity by liming
- Application of phosphate material
- Application of NPK

Improving techniques

- Mixing plow, Reversible plow, Subsoil plow
- Open ditch and underground ditch
- Organic matter application
- Deep plowing by tractor

Landuse change by one farmer in Tokachi

1949

Owned land 25ha

Cultivated land 15.8ha

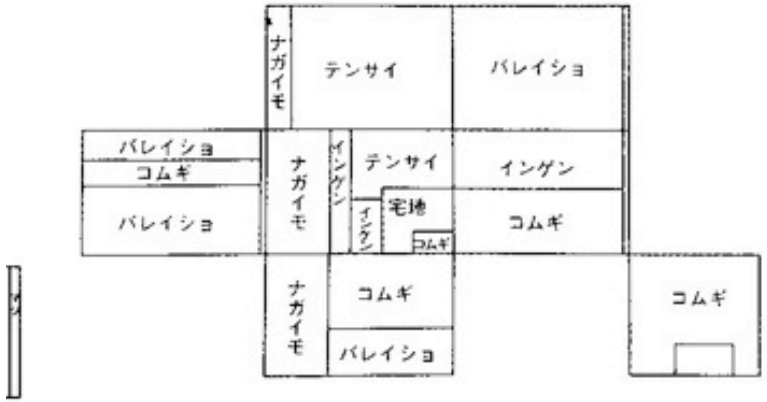
Barren land

Wet land

1995

Owned land 35ha

Cultivated land 33.4ha



Three stages in soil fertility

Concept by Prof. Kikuchi

- Stage 1: Natural soil fertility with various constraints
- Stage 2: Improved fertility by adjustment of relief, land drainage, mixing and reversing soil layers, soil acidity amelioration, etc.
- Stage 3: Improved fertility by proper fertilizer application, cropping system management for high quality and sustainability.