

Current Status of Rapeseed Breeding in Korea

Chungnam National University

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Global Industrialization





Mt. Kilimanjaro

1970

2000



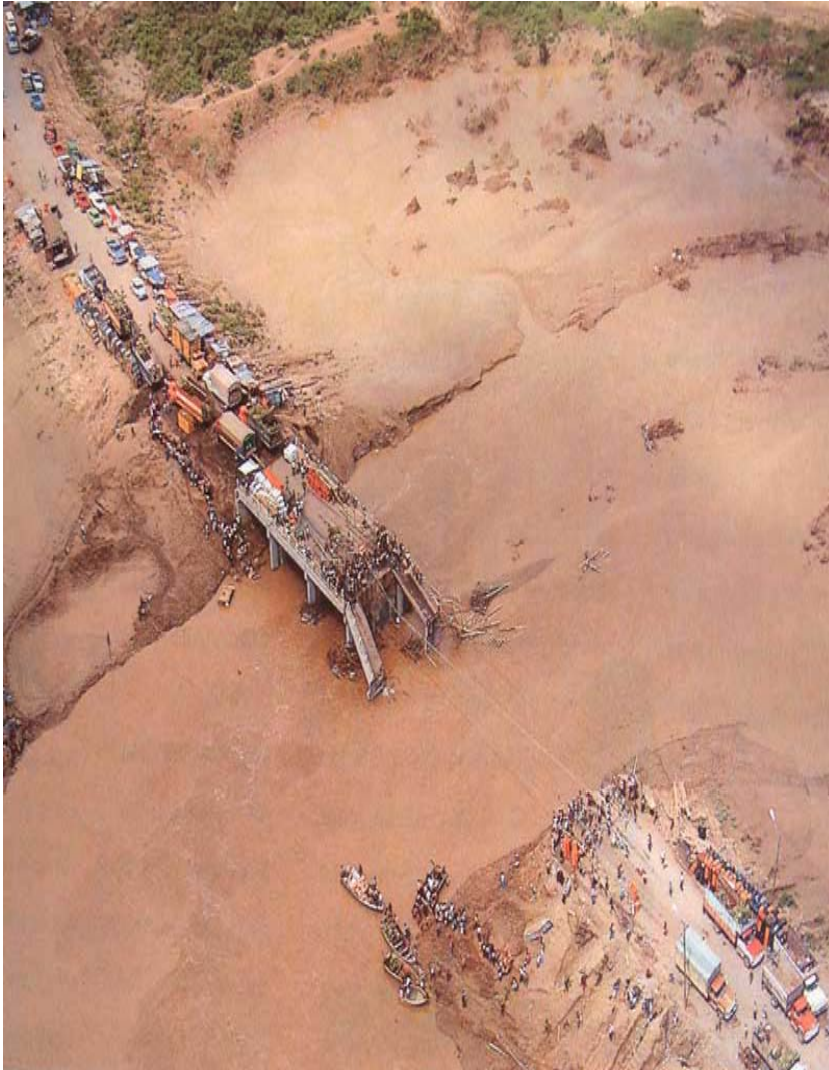
Glacier in Norway

Source : Documentary, "Inconvenient Truth"



Global disaster...

Flood damage...



Islands are sinking



Rapid desertification, and spreading





Suitable Alternative





Why is rapeseed as biodiesel ?

YELLOW REVOLUTION

2004 5 31



Plants which are used as raw materials for biofuel



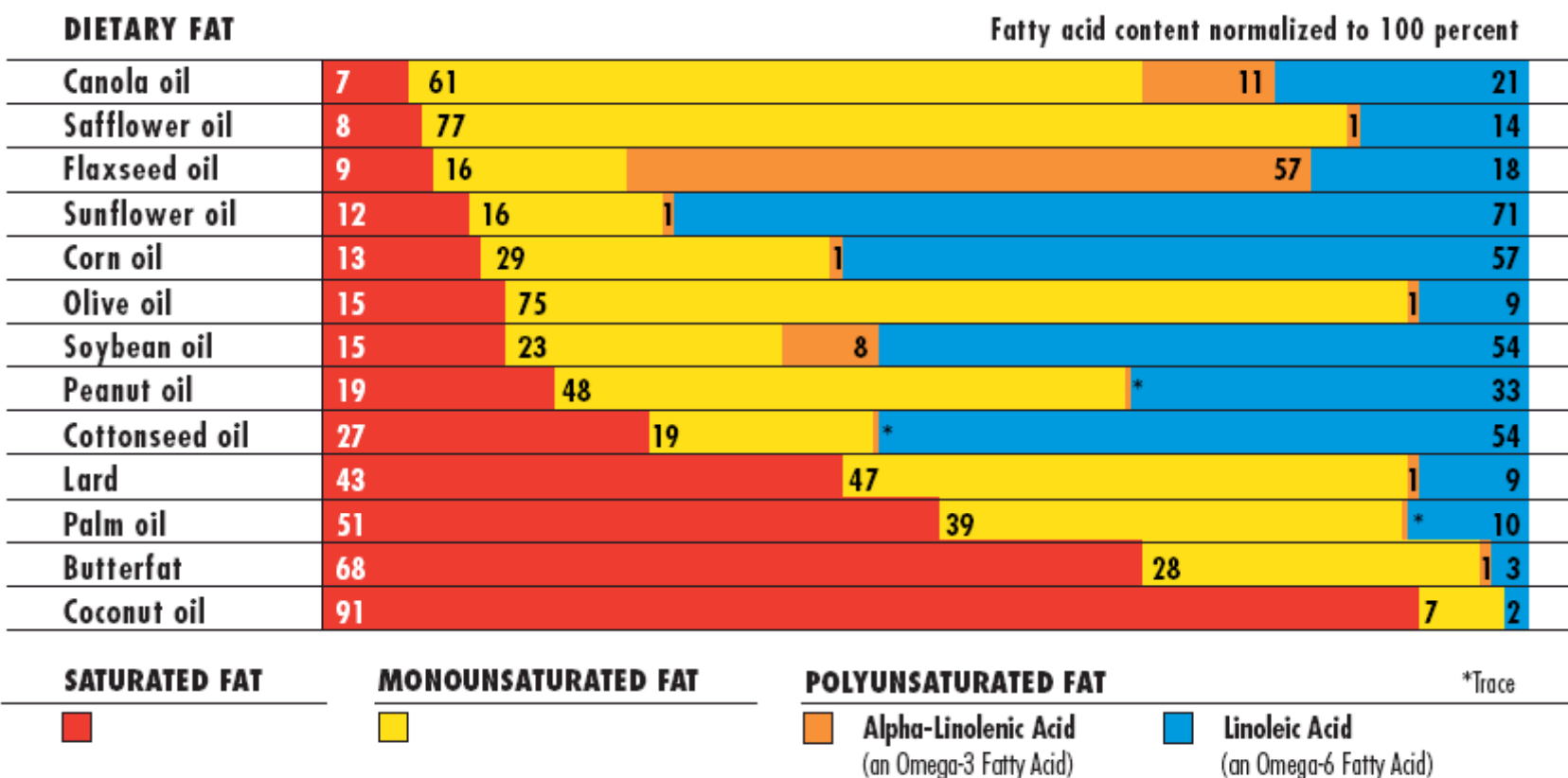


Worldwide production of vegetable oil

Production	Seed Million Metric Tons		Vegetable Oil Million Metric Tons	
	2001/2002	2002/2003	2001/2002	2002/2003
Soybean	184.33	194.04	28.87	30.60
Cottonseed	36.64	33.16	3.82	3.50
Rapeseed	35.99	32.02	12.85	11.55
Peanut	33.57	31.02	4.83	4.35
Sunflower seed	21.20	23.80	7.55	8.28
Palm Kernel	7.24	7.48	3.14	3.24
Copra	5.19	5.24		
Palm			25.32	25.64
Coconut			3.27	3.24
Olive			2.53	2.35
Total	324.16	326.76	92.18	92.75



Comparison of Dietary Fats



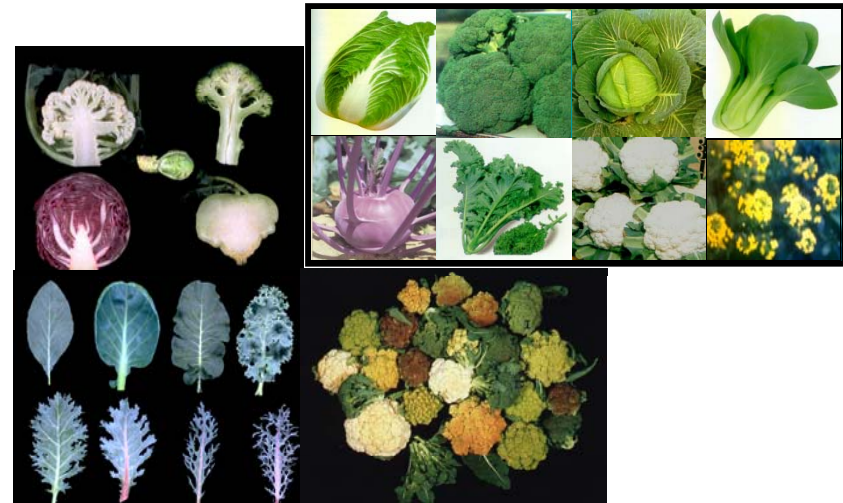
SOURCE: POS PILOT PLANT CORPORATION



Brassica Species

□ Diversity of *Brassicaceae*

- 360 genus
- 3,350 species (cultivar : 55)
- morphological and functional variation
- adaptation to various environments



□ Economic value

- Vegetable, oil, condiments, phytoremediation, bio-feul, etc
- Major materials for Kimchi
- *Brassica napus* 23.3 million ha, 46 milion tons





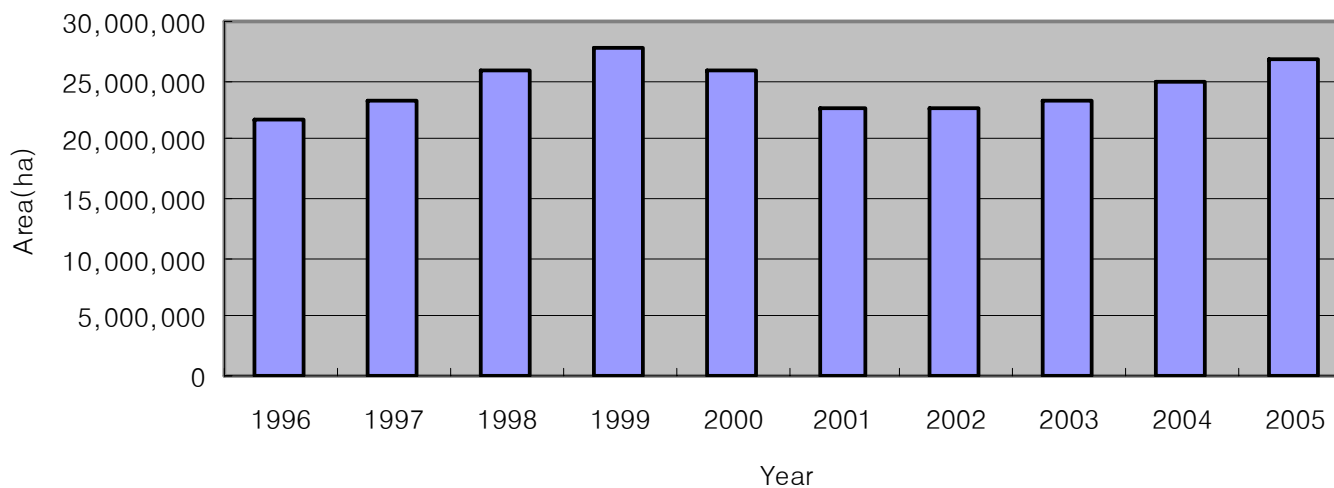
World Cultivation Area of Rapeseed

<i>Rapeseed</i>		
<i>Area Harv (Ha)</i>	1996	1997
World	21,659,170	23,377,62
Europe		
Australia		
Canada		
China		
India		
Korea, F		
Others		

2005 Rapeseed Area

2003
23,251,943
4,521,713
1,211,000
4,689,200
7,221,005
4,418,600
1,127
1,189,298

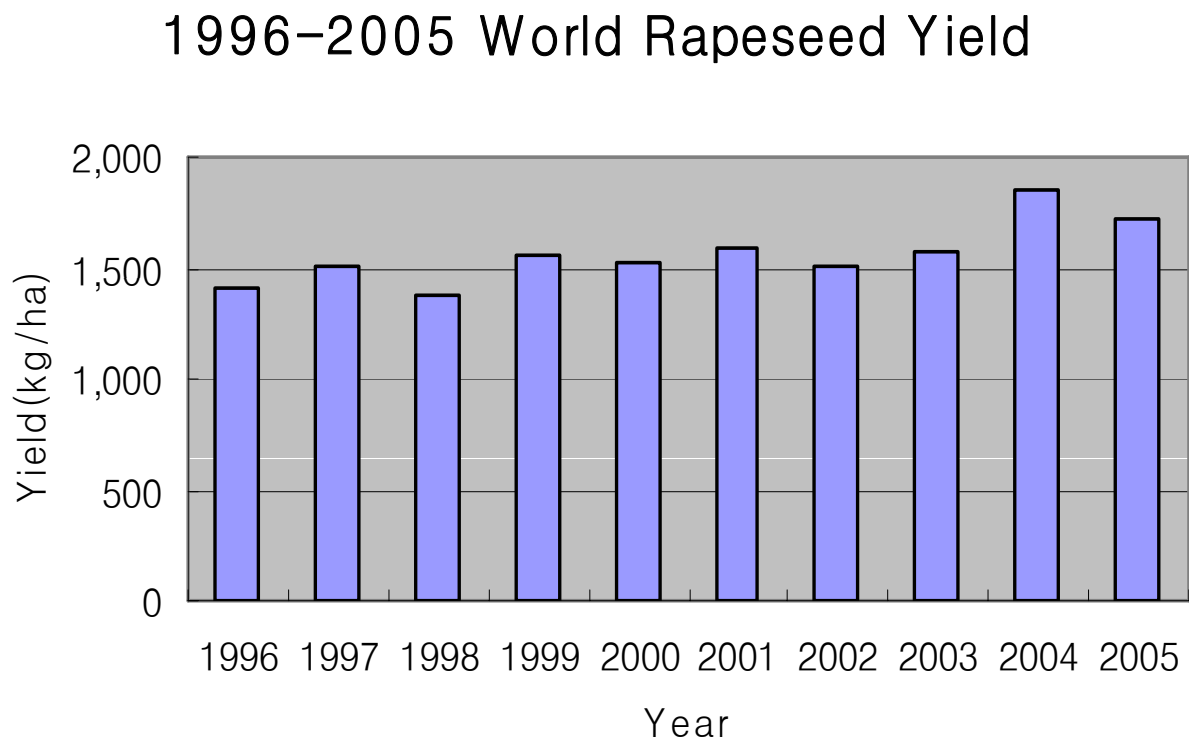
1996–2005 World Rapeseed Area





World Yield of Rapeseed

<i>Rapeseed Yield (Kg/Ha)</i>
World
Europe
Australia
Canada
China
India
Korea, Republic of



2004	2005
1,850	1,722
3,185	2,926
1,391	1,042
1,565	1,639
1,798	1,808
1,148	941
871	871



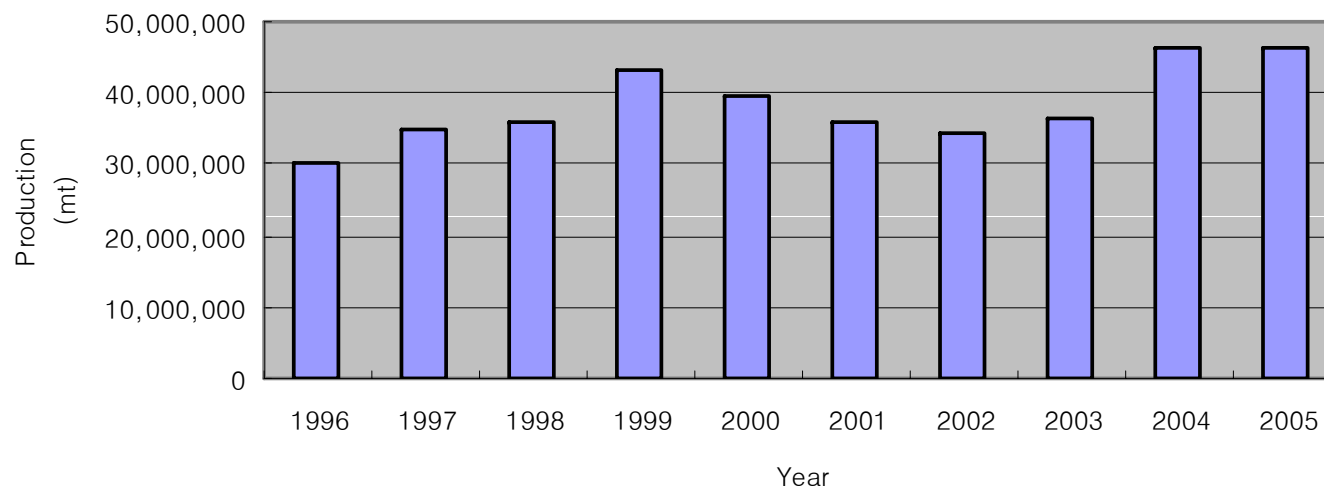
World Production of Rapeseed

<i>Rapeseed Production (Mt)</i>	1996	1997	
World	30,428,543	35,068,251	35
Europe	8,684,210	10,541,466	11
Australia			
Canada			
China			
India			
Korea, Repub			
Others			

2005 World Rapeseed Production

	2005
103	46,409,830
357	15,863,530
000	1,125,000
100	8,446,600
010	13,050,010
000	6,400,000
000	1,000
636	1,523,690

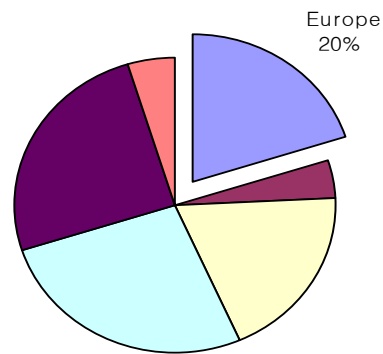
1996–2005 World Rapeseed Production



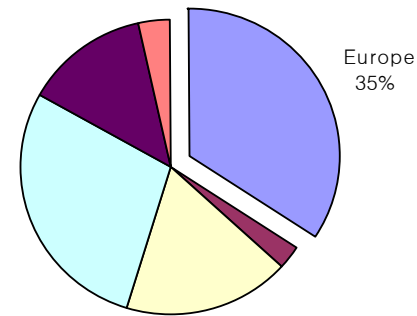


Cultivation area and yield of rapeseed - Europe

2005 Rapeseed Area



2005 Rapeseed Production



Cultivars : winter type varieties are major in *B. napus*

- Conventional variety, synthetic hybrid, composite hybrid
- Spring type varieties have been cultivated in some parts of the EU

Winter type varieties : Expert, Canverra, Disco, ...

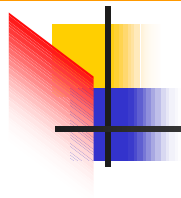
Spring type varieties : Hero, Gladiator, Senator...



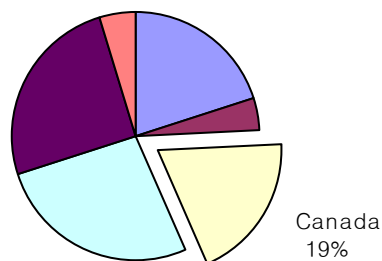




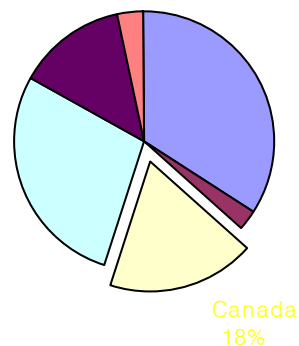
Cultivation area and yield of rapeseed -CANADA



2005 Rapeseed Area



2005 Rapeseed Production



- Spring type crops are major; *B. napus*, *B. rapa*, *B. juncea*
- Herbicide tolerant variety (GMO cultivars) occupies about 70% of the entire cultivars.

B. napus : Legacy, 46A76, Canterra1492...

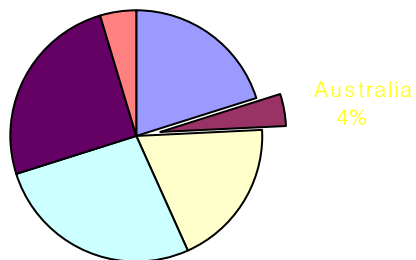
B. rapa : Reward, AC Sunbeam, Colt...

B. juncea : development of suitable two cultivars for growing in Canada (2002)

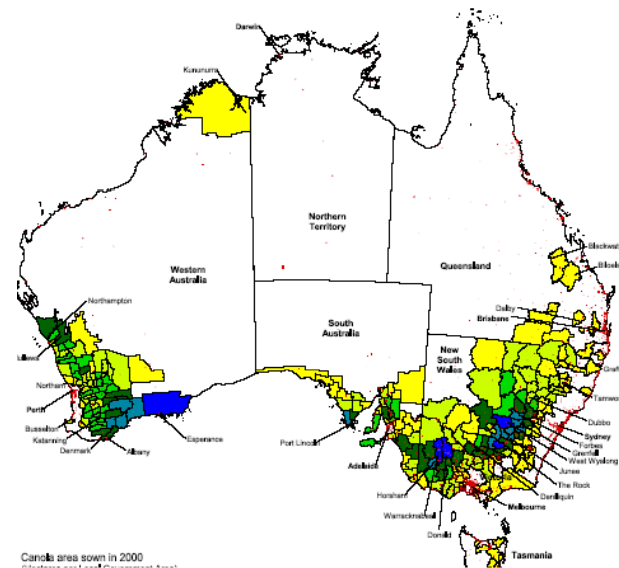
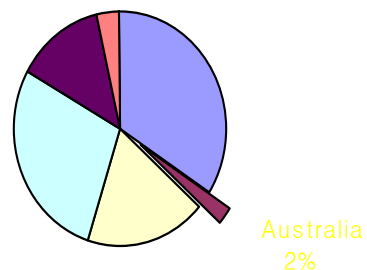


Cultivation area and yield of rapeseed -AUSTRALIA

2005 Rapeseed Area



2005 Rapeseed Production



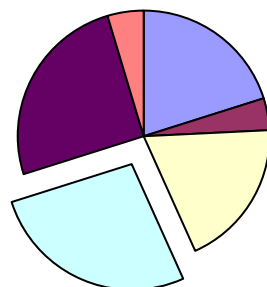
Cultivar : Spring type

B. napus : Kimberley, Outback, Rivette...



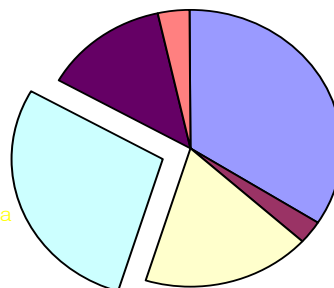
Cultivation area and yield of rapeseed -CHINA

2005 Rapeseed Area

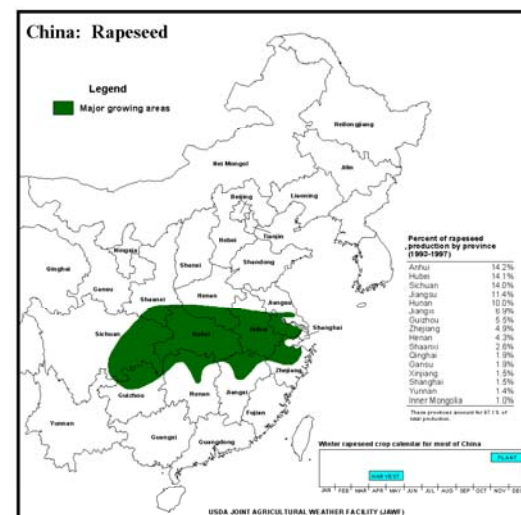


China
27%

2005 Rapeseed Production



China
28%



Cultivars : Winter type and some spring type

B. napus : Hwahyup-1, Hwayou-2790, Hwajab-3...

第12届国际油菜大会

The 12th International
Rapeseed Congress



中国·武汉









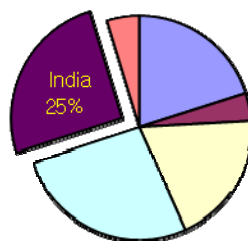




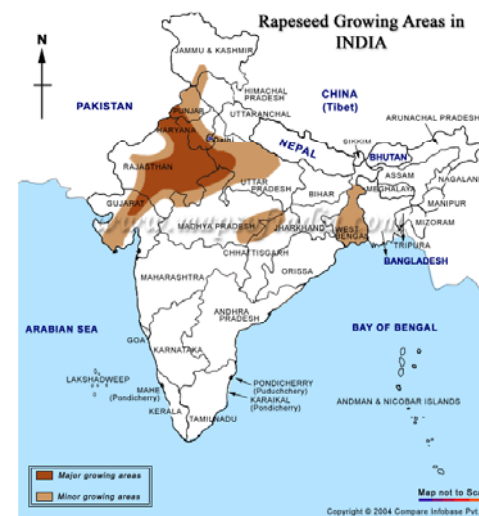
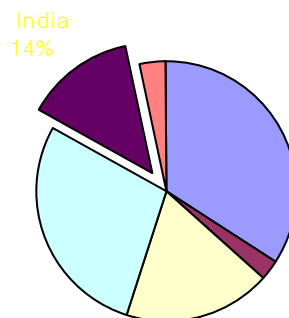


Cultivation area and yield of rapeseed -INDIA

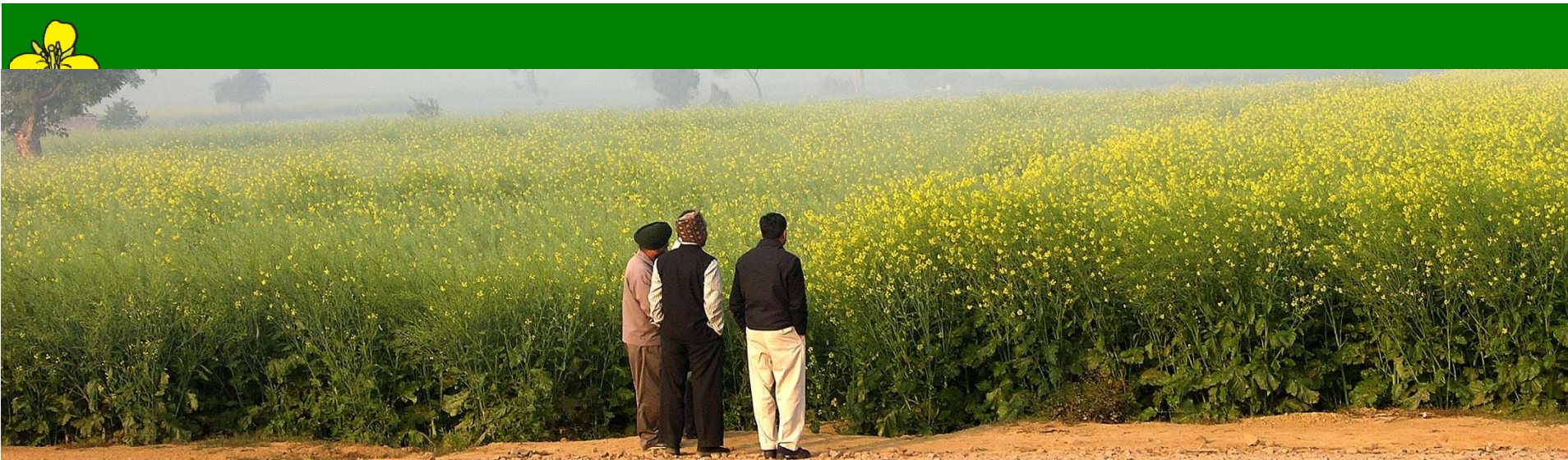
2005 Rapeseed Area



2005 Rapeseed Production

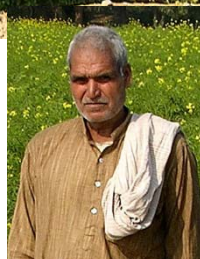


Cultivar : *B. juncea*



Check (Rohini)

Hybrid (DMH-1)



Location: Agra



Cultivation area and yield of rapeseed - Korea

Cultivation area : about 1,148ha (2005 year) (very small cultivation area)

- large portion in domestic cultivation : for landscape
- small portion : for biodiesel, for sprouting vegetable
- Absence of specific cultivars



Korea Brassica Genome Resource Bank (KBGRB) Homepage



KBGRB

To collect and maintain the genetic germplasm of *Brassica rapa* L. ssp. *pekinensis* (Chinese cabbage) and related species, a project the Korea Brassica Genome Resource Bank (KBGRB) was on-going in Korea. Further, BAC library and cDNA library as DNA resources were also an important part of KBGRB.

News

- [한국식물생명공학회] 2005년도 추계학술대회 및 향...
- [09-10-17] 중국김치 학술포럼 국산 배추 배향물
- [05-09-26] 제주, 순채 대체에너지로 부상
- [05-08-05] 제4차 국가차별연구소재개발 발표회 및 ...
- [05-07-16] 한국배추과학소연구회 개최

more

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College of Agriculture and Life Sciences Chungnam National University



분양신청내역

User ID	Jong-Mee Park
Application No.	AP06001
Application date	06. 5. 31

Access no	Sample class	Species	ssp.	Cultivar	quantity
200001	seed	<i>Brassica rapa</i>	<i>pekinensis</i>	Kenashi	20

Access no	Type of DNA library	species	subspecies	cultivar	source tissue	library name	restriction enzyme	no. clone
BAC001	BAC library	<i>Brassica rapa</i>	ssp. <i>pekinensis</i>	Chifu	leaf	KRM	HindIII	56,493

분양 신청자 정보

Applicant	Full Name	Jong-Mee Park
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Organization	Organization	Chungnam National University
	Department	Computer Science

Research objective (Detail...)	
Mailing Address	Jong-Mee Park Korea Brassica genome resource bank(KBGRB) College of Agriculture and Life Sciences, Chungnam National University Daejeon, 305-764, Republic of Korea

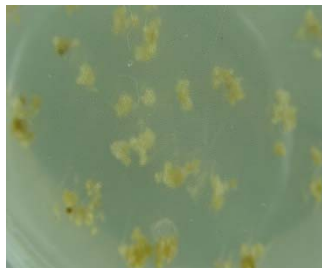
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Management of genetic resources



Development of double haploid (DH) line by anther culture



Management of Brassica germplasm and DNA stocks



No. of Genetic Resources deposited in KBGRB and Service Record

Items	Collection	Service
BAC library	179,050	584,410
cDNA library	87,003	4
Seed	5,512	3,165
Marker	1,339	-
Total	272,904	587,679



Rapeseed germplasm for Bio-fuel



Male sterility



Cold Tolerance



Current Rapeseed Breeding Field - CNU





Breeding System for Brassica napus





Characterization of Developed Variety - Gang Yu

Variety	Flowering	Maturity	Length (cm)	Number of Pod	Number of Seed	1 st branch	Length of Pod (cm)	Lodge (0~9)	Phoma (0~9)	Winter Hardiness
Gang Yu	Apr. 28	Jun.20	180	59	27	8	7.8	0	0	Good



Before winter 2005.11.14



After winter 2005.12.20



Flower 2006. 5.4



Mature 2006. 6.12



Above: Control, below: Gang Yu













Composition of Fatty Acid in “Gang Yu”

Oil Contents	Palmitic Acid (16:0)	Oleic Acid (18:1)	Linoleic Acid (18:2)	Linolenic Acid (18:3)	Arachidic Acid (20:0)	Behenic Acid (22:0)	Erucic Acid (22:1)	Others
45.1%	4.3	71.4	16.1	1.3	4.9	0.0	0.0	2.0

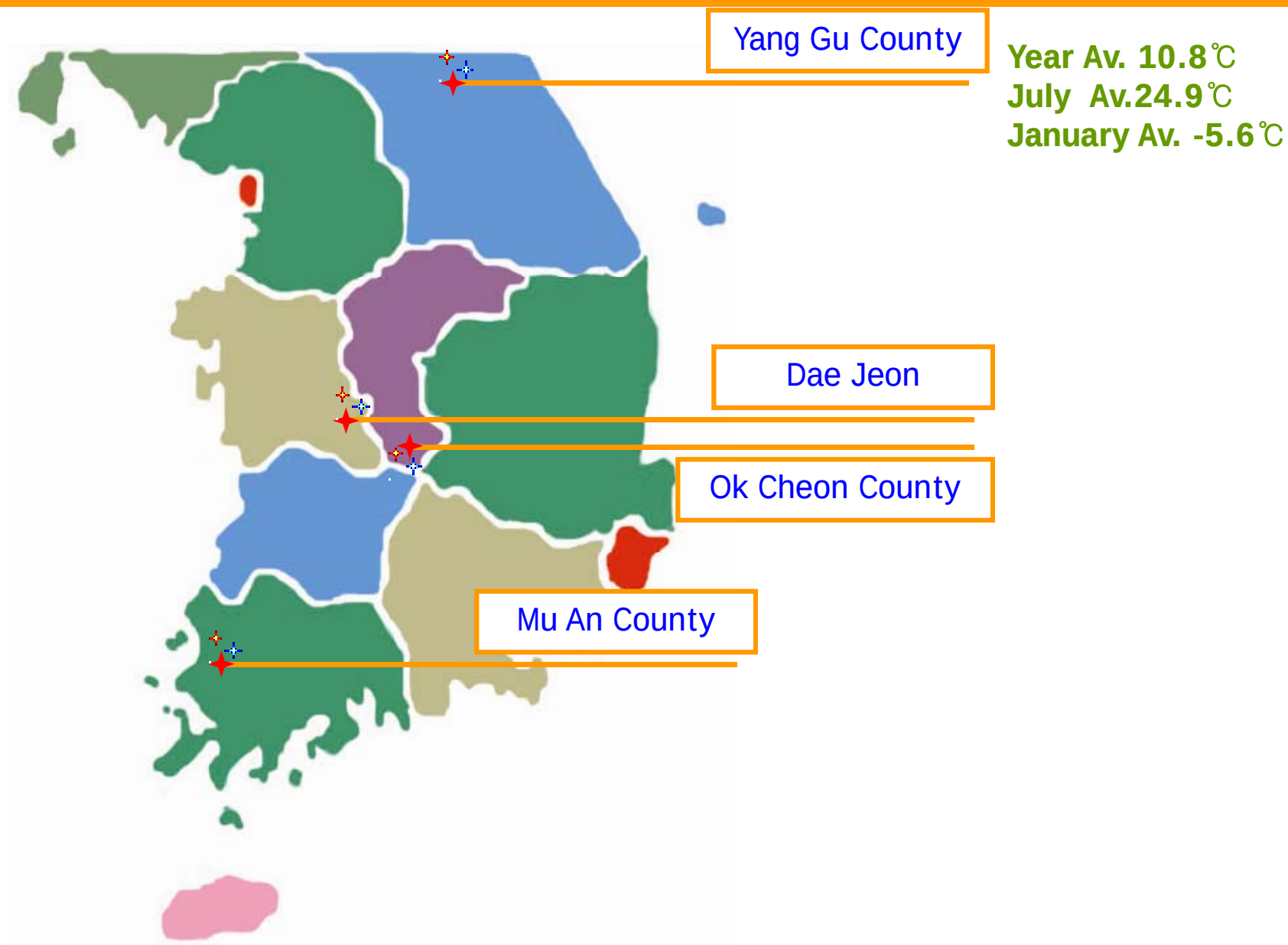


Field Trial Data of Gang Yu

Yield	Gang Yu	Sun Mang	Casino	Ceres	Jetton	Kronos	Maestro	Plainsman	Rasmus	Summer	Talent	Titan	Viking	Wichita	Wotan
2005-2006	122	-	69	24	102	118	108	86	85	66	100	110	80	69	83
2006-2007	106	84	36	43	49	81	85	53	73	87	100	91	83	41	-
Plant height(cm)	181	130	187	170	168	189	177	186	164	175	178	182	164	170	184
Cold Tolerance	S	W	S	S	S	S	S	S	S	S	S	S	S	S	S
Flowering Date	4.17	3.13	4.19	4.17	4.16	4.17	4.15	4.21	4.16	4.15	4.15	4.16	4.15	4.17	4.21



Field Trial Area of Kang Yu

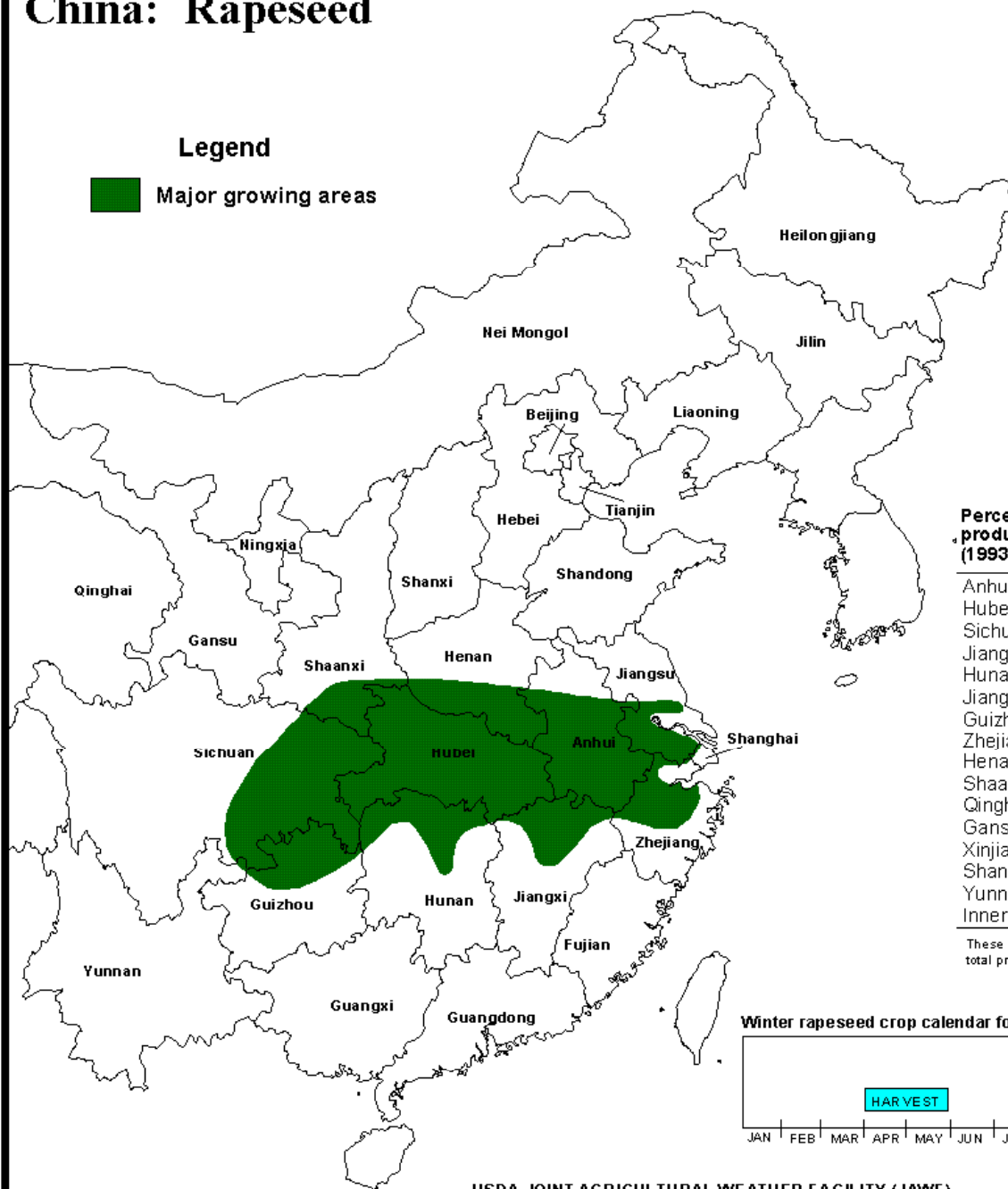




China: Rapeseed

Legend

 Major growing areas

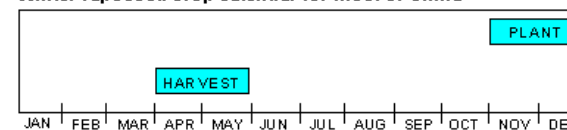


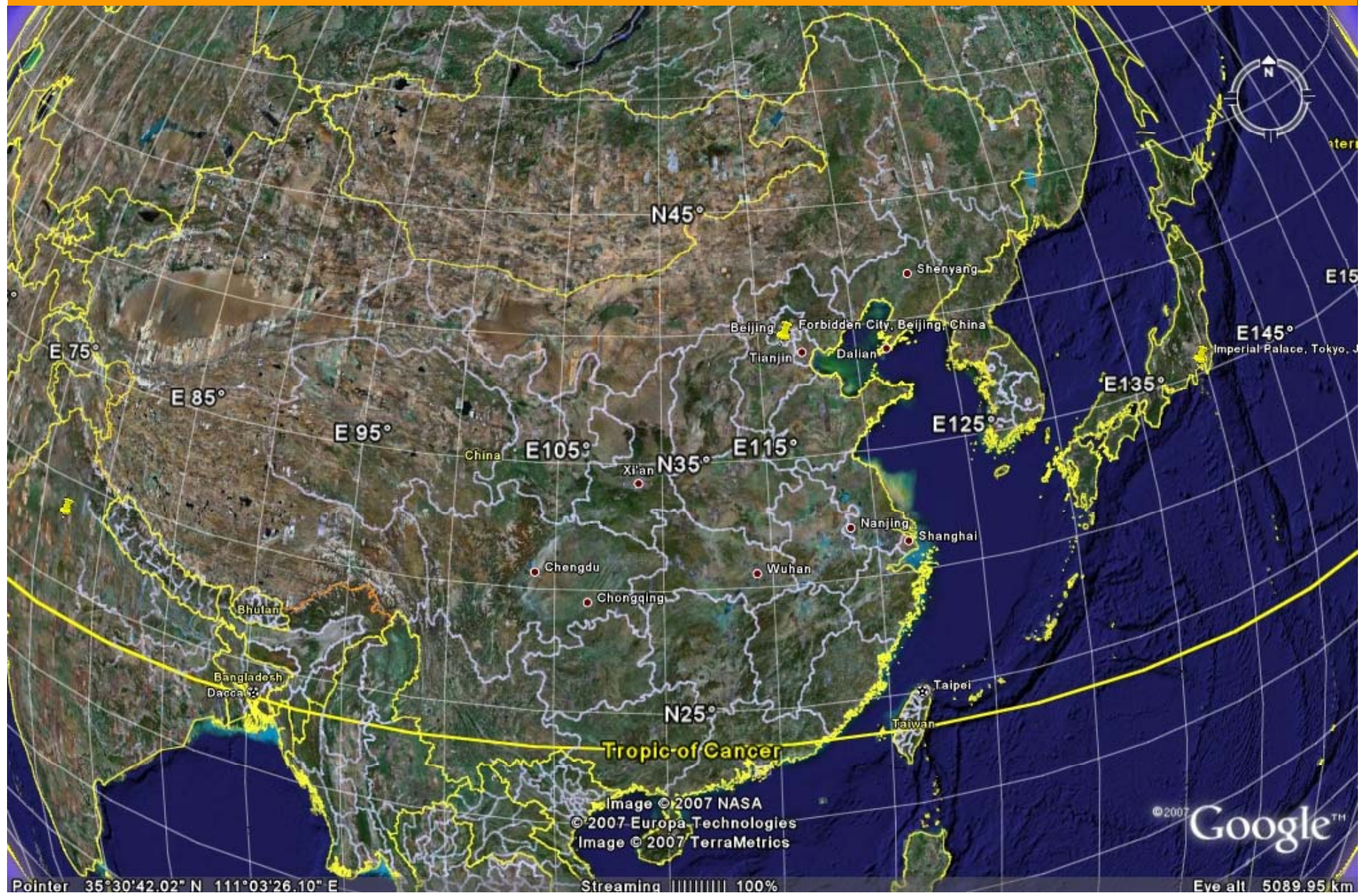
Percent of rapeseed production by province (1993-1997)

Anhui	14.2%
Hubei	14.1%
Sichuan	14.0%
Jiangsu	11.4%
Hunan	10.0%
Jiangxi	6.9%
Guizhou	5.5%
Zhejiang	4.9%
Henan	4.3%
Shaanxi	2.6%
Qinghai	1.9%
Gansu	1.9%
Xinjiang	1.5%
Shanghai	1.5%
Yunnan	1.4%
Inner Mongolia	1.0%

These provinces account for 97.1% of total production.

Winter rapeseed crop calendar for most of China







Dae Jeon



Dae Jeon



Ok Cheon County -1



Ok Cheon County -1



Ok Cheon County -1



Ok Cheon County -1



Ok Cheon County -2



Ok Cheon County -2



Mu An County

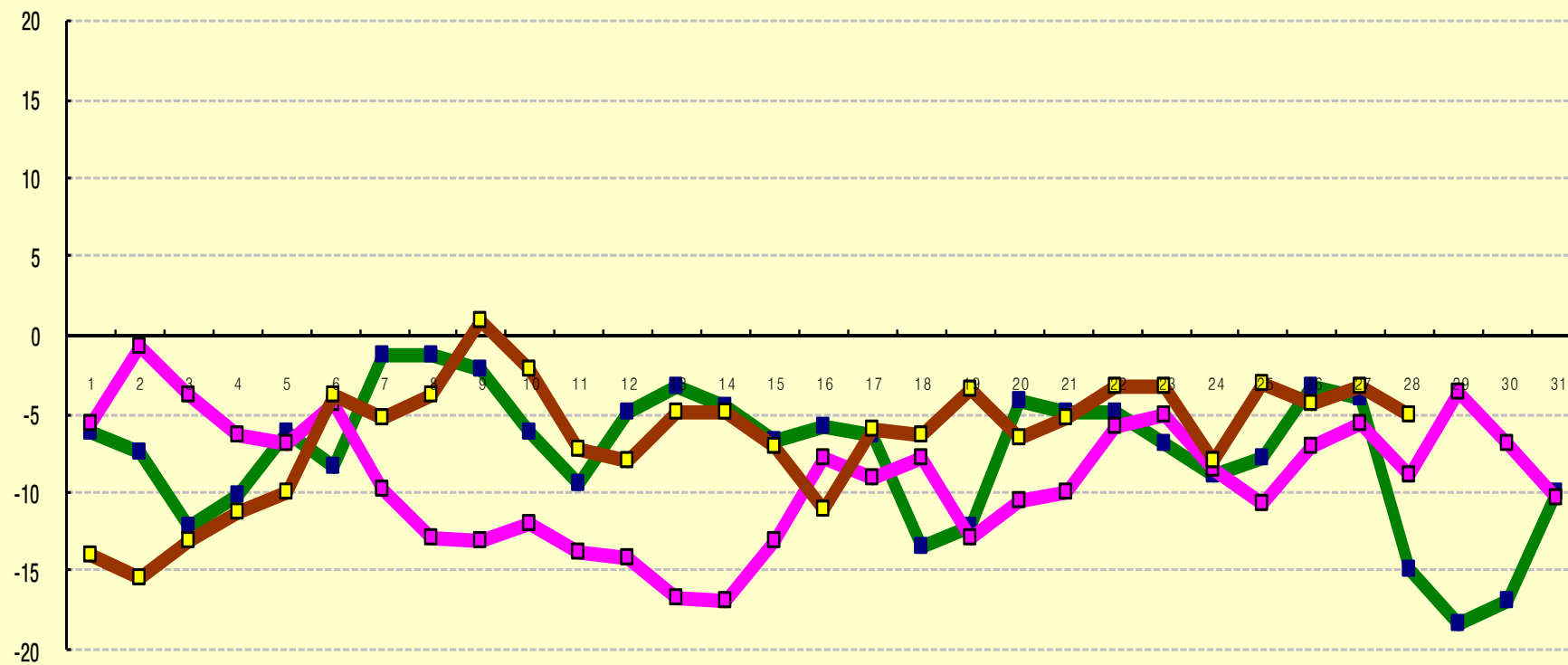


Mu An County





월 최저 기온



— Dec. 2006 — Jan. 2007 — Feb. 2007

Yang Gu County



Research Team



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Comparative Genomics

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Tissue Culture and Gene Function

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Vanjildorj, Enkhchimeg

Seo Young Song

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Molecular Breeding

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Yeh Bong Lee

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Hyeon Kook, Yang

In Ae Park

He Sig Lee

Joung Mi Park

4 undergraduate students

<http://www.yplim.info>





Yang Gu County



Yang Gu County



Yang Gu County







Thanks for your attention

