

Food Treatment and EB/X-ray irradiation in Korea

Bumsoo Han, Yuri Kim, Nathan Zommer

Pele Inc.

Milpitas, California



Yoo Kyung Jung

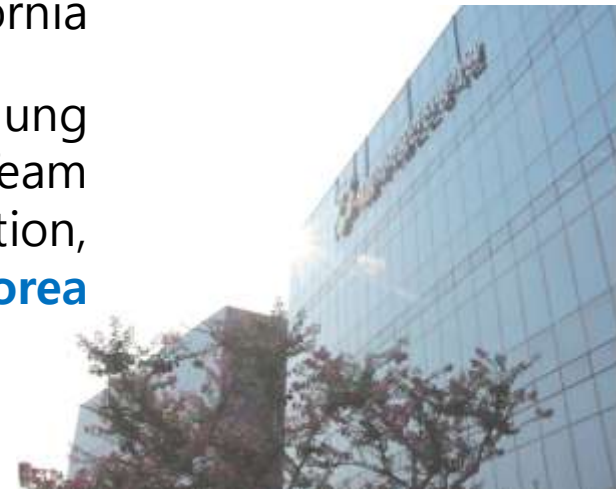
New Hazardous Substances Team

National Institute of Food and Drug Safety Evaluation,

Ministry of Food and Drug Safety of Korea



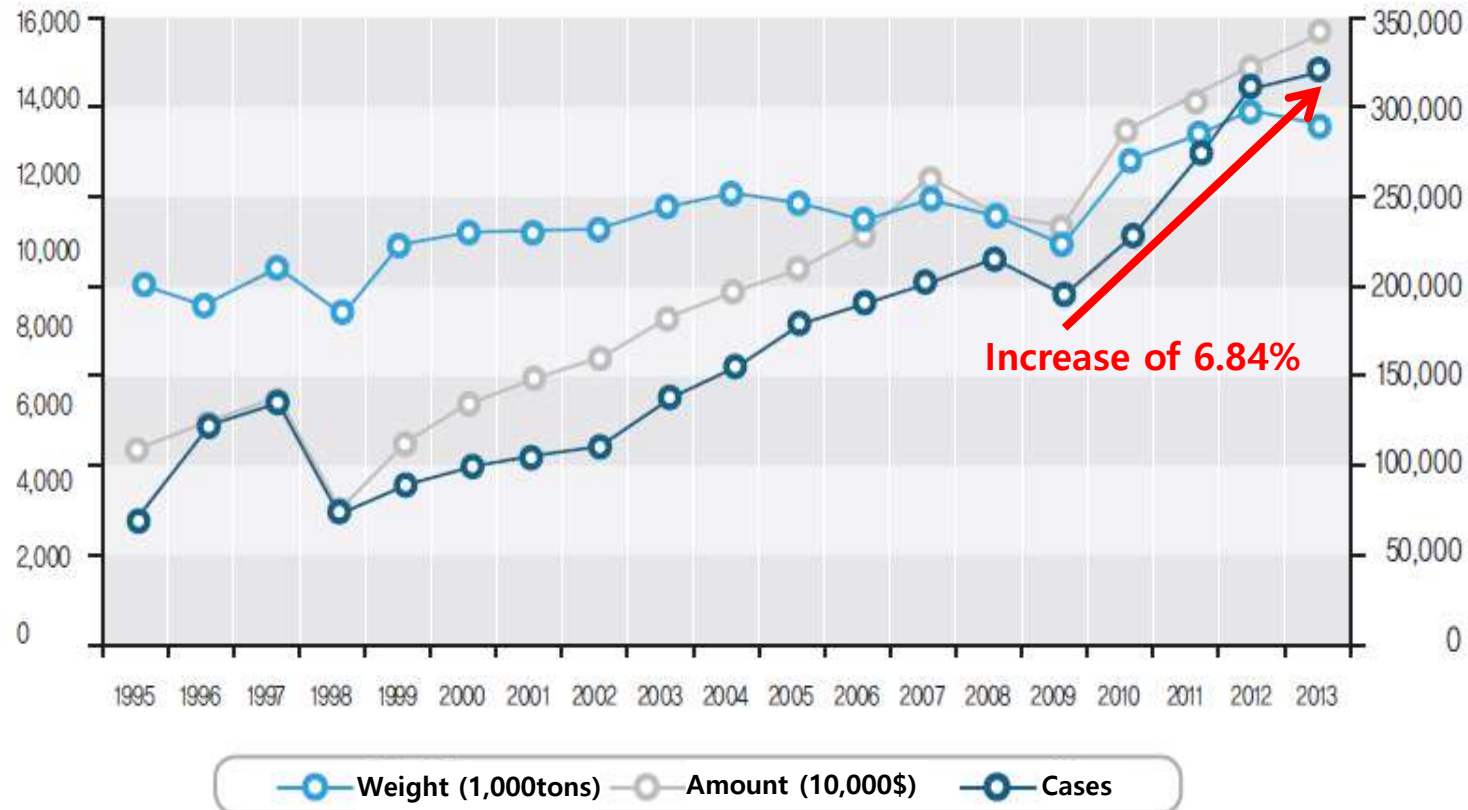
MINISTRY OF
FOOD AND DRUG SAFETY



Status of Imported Food in Korea

Weight, Amount

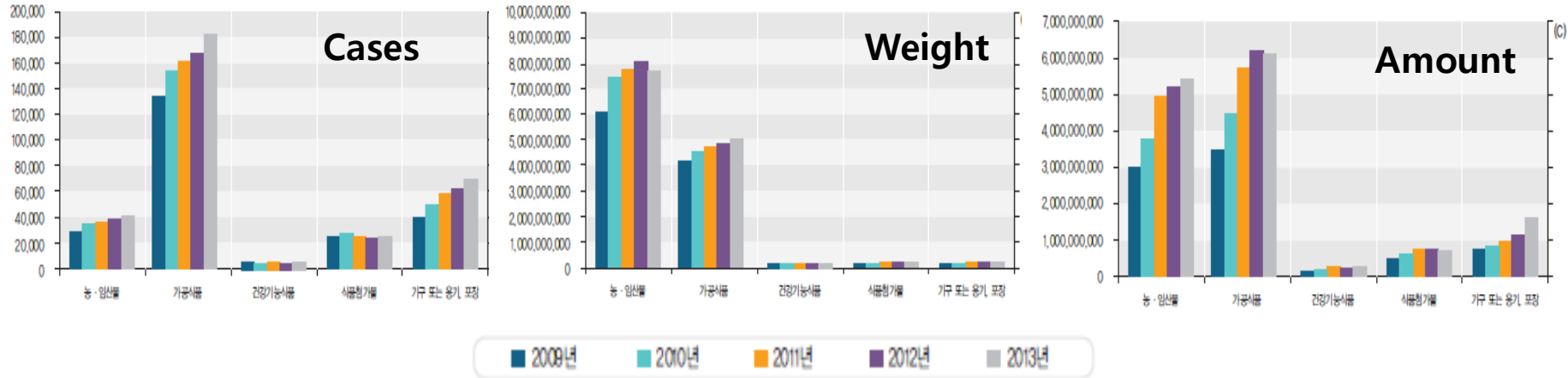
Total cases



[Ref. Inspection Report of Imported Food in Korea, 2014

About 67% of Food items are imported

Status of Import Report by Items ('09~'13)



[Ref. Inspection Report of Imported Food in Korea, 2014

- **Cases** **Processed Food (53.6%)**, Packaging (21.0%), Agro & Forest Products (14.1%), Food Additives (9.1%), Health/Functional Food (2.3%)
- **Weight** **Agro & Forest Products (58.3%)**, Processed Food (37.5%), Packaging(2.1%), Food Additives (2.0%), Health/Functional Food (0.1%)
- **Amount** **Processed Food (42.6%)**, Agro & Forest Products (38.3%), Packaging11.6%), Food Additives (5.1%), Health/Functional Food (2.4%)

※ 농·임산물은 옥수수, 밀, 대두, 쌀(매현미), 바나나, 타피오카, 보리, 고추, 오렌지 등이 수입 순위 상위를 차지하였으며, 가공식품은 정제, 가공을 거쳐야 하는 정제용 대두 유, 팜유, 팜핵유, 원당 등과 같은 식품원료, 배추김치, 과·채가공품, 정제소금, 천일 염, 백설탕, 연육, 서류가공품 순으로 상위순위를 차지

Status Quarantine Process for Import & Export

First Half of 2015(2,039,000 cases)

1) Import

	Items	Major Countries
cereals	wheat	U.S., Australia
	corn	Romania, U.S.
	bean	Brazil, U.S.
fruits	banana	Philippines, Guatemala
	orange	U.S., Spain
	grape	Chile, Peru, Australia
	pineapple	Philippines, Costa Rica
	kiwi	New Zealand, Chile
	Grape fruits	U.S., South Africa
	cherry	U.S., Australia
	mango	Thailand, Philippines
	lemon	U.S.
vegetables	carrot	China, Viet Nam
	pumpkin	New Zealand
	burdock	China, Taiwan
	Balloon flower	China
	garlic	China
	lettuce	Taiwan, China
	cabbage	China, Belgium
	broccoli	China, New Zealand
	onion	China
	Frozen pepper	China, Viet Nam
	Frozen garlic	China, Viet Nam

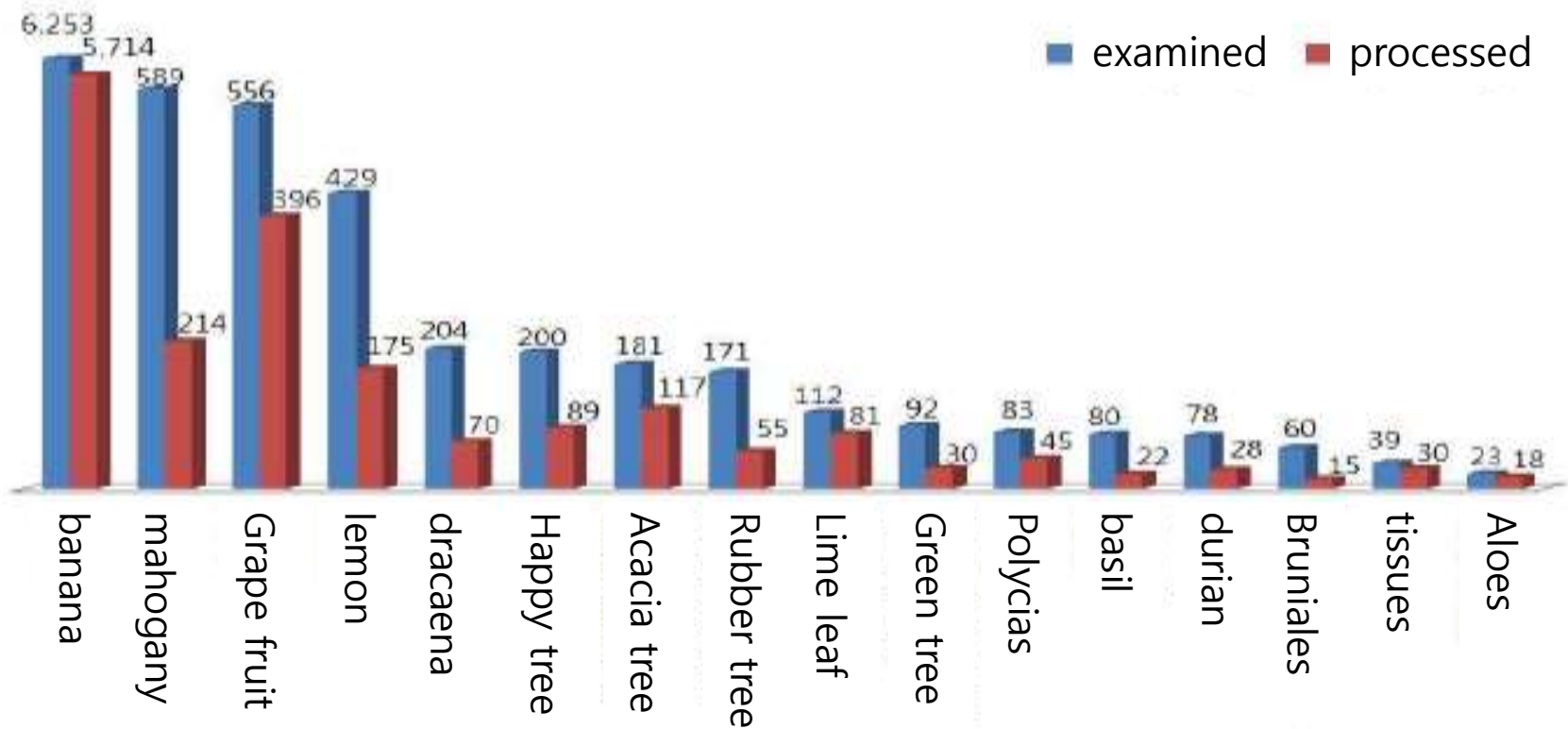
<Major Quarantine items (import)>

2) Export

	Items	Major Countries
cereals	Corn starch	Philippines, Indonesia, Malaysia, Viet Nam
	Wheat flour	Viet Nam, Indonesia, China
	defatted soybean	Viet Nam, Malaysia, Russia
fruits	pear	Taiwan, U.S., Viet Nam
	Sweet persimmon	Malaysia, Cambodia
	apple	U.S., Taiwan, Viet Nam
	chestnut	Taiwan, North Korea, Japan, U.S.
	Frozen persimmon	U.S., Japan
vegetables	paprika	Japan, Taiwan, Russia
	Napa cabbage	Taiwan, Canada, Japan, Guam
	tomato	Japan, Russia, Guam, Mongol
	cabbage	Japan, Taiwan, Sipan
	white radish	U.S., Guam, Canada, Viet Nam
	onion	Taiwan, Viet Nam, Russia
mushrooms	enokitake	U.S., Australia, Viet Nam, Canada
	pleurotus eryngii	Canada, U.S., Australia, Netherland
	oyster mushroom	Canada, U.S., Australia, Philippines

<Major Quarantine items (export)>

Status Quarantine Process for Import & Export



<Top Quarantine Processed Imported Items>

[Ref. Quarantine Process report for Import & Export in first half of 2015]

Quarantine process in the first half of 2015, insects and coccid were found (~4%) in Banana, Grape fruit, lemon, Durian, lime leaf – fumigation or discard.

Quarantine Report for Agro-products

(Unit: MT)

Year	Items	Inspection		Fumigation		Discard	
		Cases	Weight	Cases	Weight	Cases	Weight
2012	Fruits	287,045	876,464	17,481	386,146	47,576	308
	Vegetables	877,548	694,185	767	7,119	8,949	2,687
2013	Fruits	299,287	819,409	24,093	536,018	58,713	362
	Vegetables	742,369	660,641	840	8,692	10,737	1,638
2014	Fruits	450,940	839,595	23,650	522,230	70,734	1,686
	Vegetables	723,693	612,726	494	1,782	14,228	1,506

Recently the quarantine process of fruits and vegetables are increased as the amount of import is increased annually, and hence the amount of fumigation and discard is also increased.

Quarantine Report for Agro-products

Items	Test Code	Products	Case
Processed Food	Permethrin	Leached tea	1
	Prochloraz	Leached tea	1
	Triazophos	Leached tea	1
	Irradiation	dried seasoned fish	3
		confectionery (cracker)	1
	Tar color	Candies (lollipop)	4
		Candies (jelly)	4
	Fenvalerate	Leached tea	1
	preservatives	Juice from fruit/vegetables	3
	benzopyrene	Sunflower oil	2
		Pressed pepper seed oil	1
		Canola oil	1
	mycotoxin zearalenone	confectionery (biscuit)	1
		Infant/baby food	1
	Chlorpyrifos	Leached tea	6
	Methidathion	Leached tea	2
	preservatives	dried seasoned fish	1
	acidity	Other starch	1
	Isoprothiolane	Leached tea	1
	fumonisin	Grain products	1
		confectionery (snacks)	1
	debris	dried seasoned fish	2
	Ochratoxin A	Pepper powder	4
		noodles	3
	Hydrogen peroxide	dried seasoned fish	1
	malachite green	Fish products	1
	Aflatoxin (total)	Pepper powder	3
		Natural spices	1
		nuts	2
	others	confectionery (snacks)	2

<imported processed food>

<Status of Unconformity>

Reason for unconformity	case	weight(kg)	amount(\$)
Violate the irradiation standard	3	37,980	225,910

<Annual Unconformity >

	Year				
	2009	2010	2011	2012	2013
Violate the irradiation standard	0	25	25	5	3

Approved Food Items in Korea for Irradiation

E beam (under 10 MeV) or Gamma ray, not yet in X-ray

Items	Purpose	Dose (kGy)
Potato, Onion, Garlic	Sprout inhibition	0.15 <
Chestnut	insecticide, Sprout inhibition	0.25 <
Mushrooms	Insecticide, Shelf life control	1 <
Egg powders Cereals, Beans Starch	Sterilization Insecticide, Sterilization Sterilization	5 <
Dry meat product Powders of fishes, shellfishes, crustacean Powders of soybean paste, red pepper paste, soy sauces Dried vegetables Products of Yeast, Enzyme Algae food Aloes powder Ginseng (including red Ginseng)	Sterilization	7 <
Dried spices Seasoned food Sauces Leached tea Powder tea Diets for patients	Sterilization	10 <

Gamma-ray irradiation facilities in Korea

Field	Capacity	Installed	remarks
Greenpia	1MCi	800kCi	Commercial
Soya GreeTech.	1MCi	500kCi	Commercial
KAERI (ARTI)	490kCi	300kCi	Research
KAERI (ARTI)	Gamma Irradiator (3kCi)		Research
JeJu Univ.	Gamma Irradiator		Research

Industrial Electron Accelerators in Korea, 2014

Field	Installed	Operation	Companies
Wire and Cables	16	13	LS Cables (4), KyungSHin (3), Deryook (4), Daewon (1), CosmoLink (1), DaeHan (1), LAPP Korea (1), Sampoong (1)
Radial Tires	5	3	Hankook (3), Kumho (2)
Foams, Sheets	11	9	YoungBo (4), LG Hausys (3), Tongil (1), Bowon (1), Polycell (1), EB TECH (1)
Tube/Film	6	5	Tapos (2), KDK (1), Samwhan (1), Hanmi Cable (1), EB TECH(1)
Curing etc.	3	1	Ceratech (1), TetraPack(1), EB TECH(1)
Sterilization	3	2	EB TECH (1), GEV (1), KAPRA (1)
Wastewater Treatment	2	1	DYETEC (2)
Mobile e-beam	2	2	KAERI (1), EB TECH (1)
X-ray conversion	14	14	Customs Services
R & D	11	10	KAERI (2), EB-TECH (4), KAPRA(3), KRICT (1), YoungNam Univ. (1) etc.
Total	73	60	

Soya Greentech, γ

GreenPia, γ

10MeV, EB/X

5MeV, EB/X

10MeV, EB/X

Electron Accelerators in Korea as of 2014



Pele Inc. U.S.



Joint venture of IXYS Corp. and EB TECH Co.
The head office is in Milpitas, California



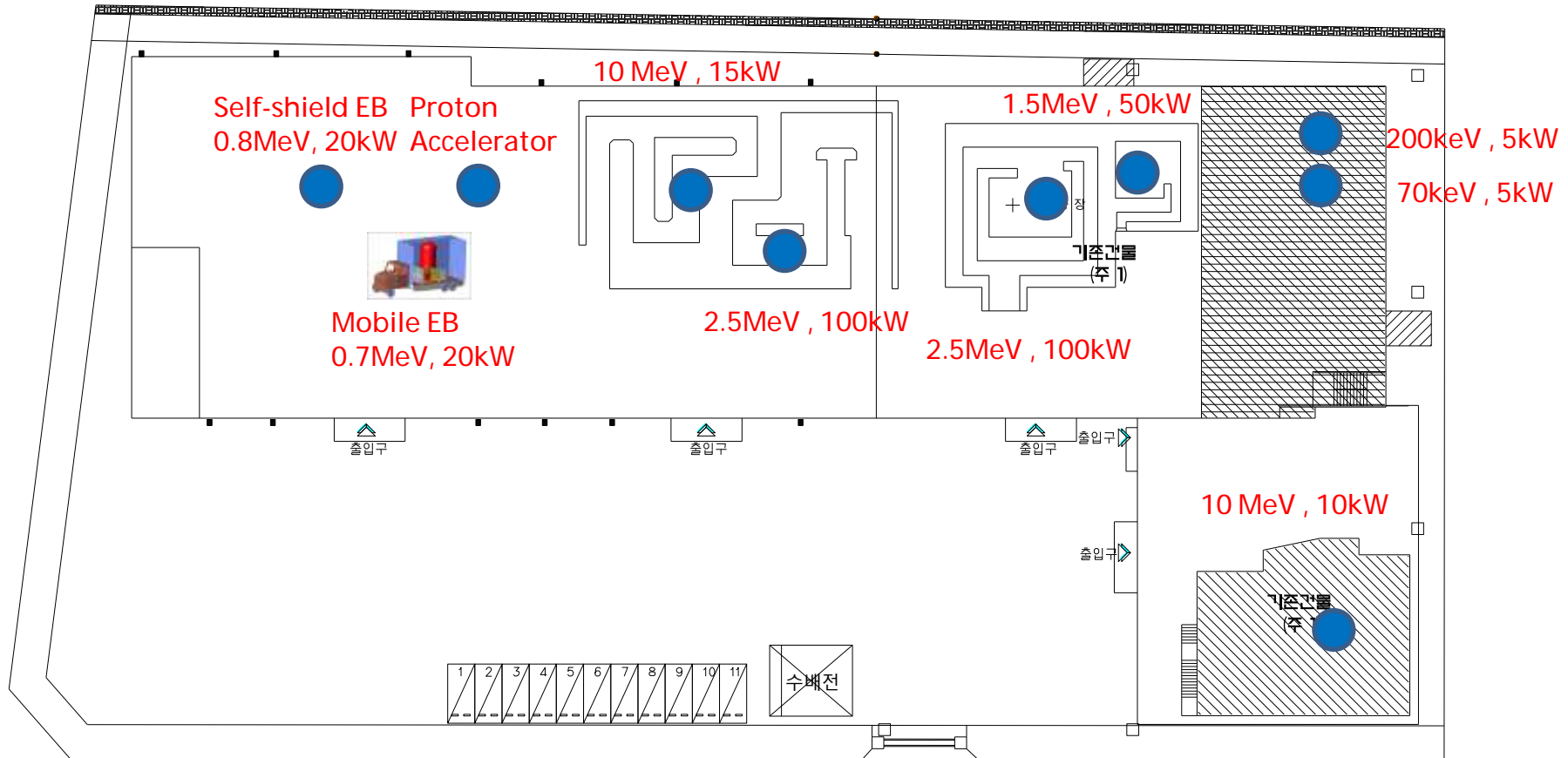
IXYS Corp. is a company in NASDAQ based on semi-conductors and electronics with 500 M USD annual revenue



EB TECH Co. is accelerator manufacturer and service provider, and has installed over 60 electron accelerators in Korea, China, Turkey, Singapore, Philippines..





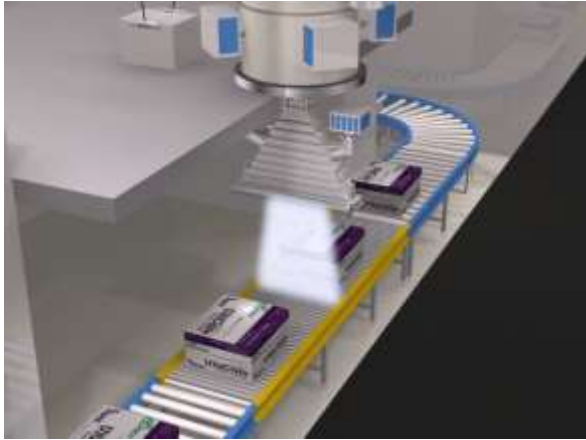


Irradiation Facilities in EB TECH

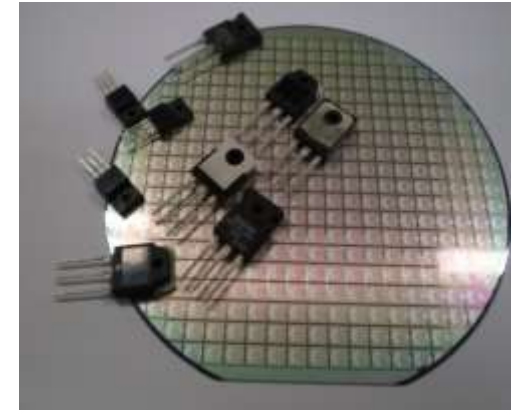
- Equipped 9 electron accelerators and several X-ray systems, laboratories
- 6 accelerators in irradiation service (0.5~10MeV) for semi-con, polymer etc.

Pele Inc. U.S.

To develop for food/healthcare products irradiation system



To develop the semiconductor and electronic components irradiation

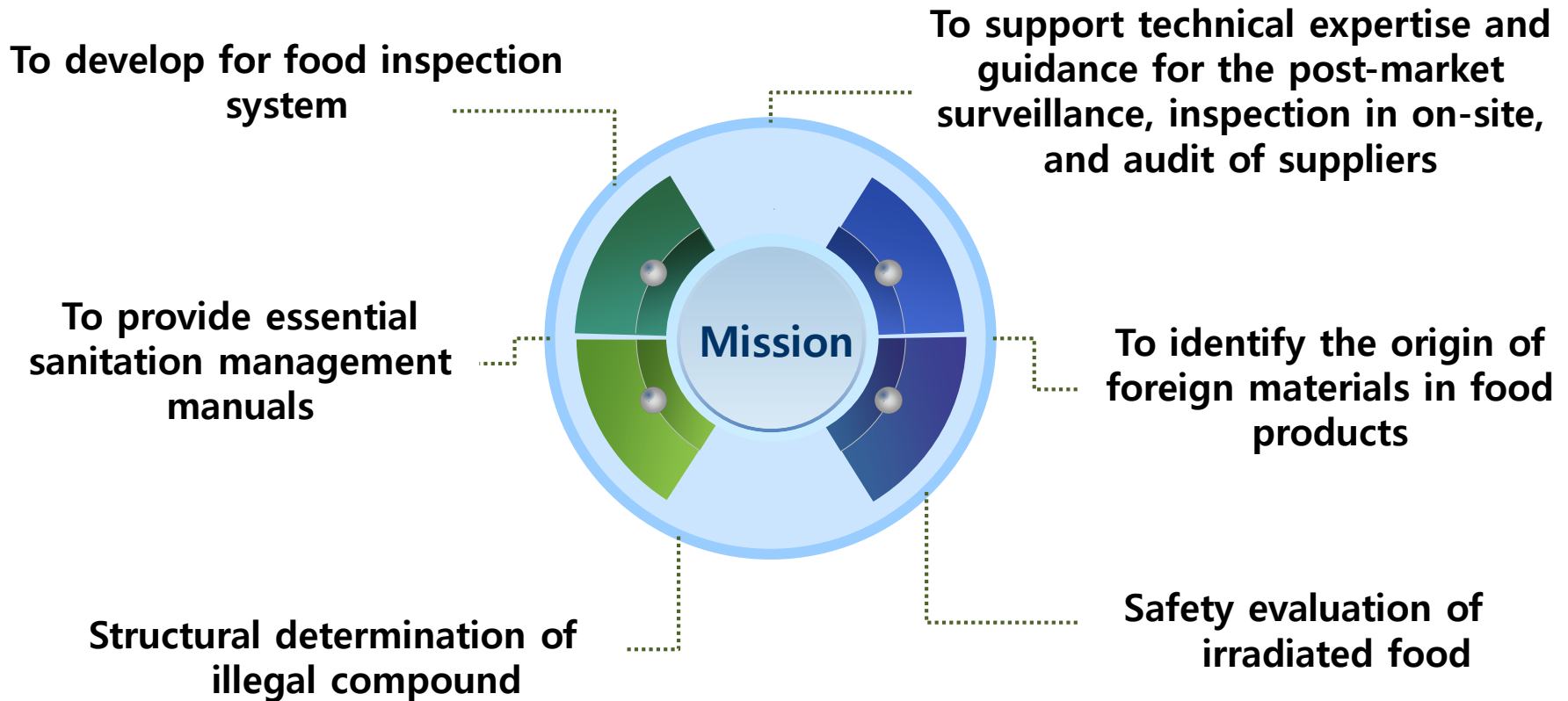


Demonstration of e-beam with mobile accelerator

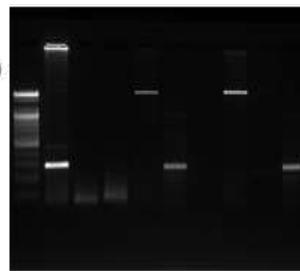
Environmental Application of e-beam technology



New Hazardous Substances Team



MINISTRY OF
FOOD AND DRUG SAFETY



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MASK WEAR

EDTECH

입 구
(IN)

EDTECH

출 구
(OUT)



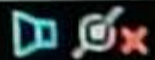
중독위험





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2015/03/20

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X 7 k



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X 1 kGY



X 7 kGY

자른라시마

300g



X 7 kGY

자른라시마
300g



X 7 KGY
자른다시마
300g

X 7 KGY
자른다시마
300g

X 10 KGY
페퍼민트

자른다시마
300g

X 10 KGY

X 7 KGY
자른다시마

X 7 KGY
자른다시마







Qunshuherb
Relaxing petals, Indulgences 100g

양동기원 2017.09.26까지

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1000 Gy

1 Gy

2 kGy

2 kGy

Summary

- Due to the increase of imported fruits and vegetables in Korea, insects and coccid were found in those products. They are fumigated or discarded after the quarantine process. Thus, a proper and adequate treatment process is required.
- Over 25 food items are approved for irradiation both by gamma ray (Co-60) and electron beam (below 10MeV), but not yet for X-ray.
- Together with Ministry of Food and Drug Safety of Korea and EB TECH, experiments to find the optimal doses for food items with e-beam and X-ray are in process.
- 2 commercial gamma irradiation facilities and several EB plants are working for irradiation services, however, due to public acceptance the after the Fukushima accident, practically no food items are irradiated in Korea.
- Pele Inc., a joint venture of IXYS and EB TECH are working to extend the application of electron beam (X-ray) in Food irradiation, Sterilization of healthcare products, Semiconductor and pollution control.

Muchas gracias.

