MUTATION BREEDING

REVIEW

Joint FAO/IAEA Division
of Nuclear Techniques
in Food and Agriculture
and FAO/IAEA Agriculture and
Biotechnology Laboratory, Seibersdorf
International Atomic Energy Agency
Vienna

CONTENTS

No. 12 **December 2000**

OFFICIALLY RELEASED MUTANT VARIETIES - THE FAO/IAEA DATABASE

M. MALUSZYNSKI, K. NICHTERLEIN, L. VAN ZANTEN and B. S. AHLOOWALIA

Plant Breeding and Genetics Section
Joint FAO-IAEA Division
International Atomic Energy Agency
P. O. Box 100, A-1400, Vienna, Austria

ABSTRACT

In the approximately 70 year-old history of induced mutations, there are many examples on the development of new and valuable alteration in plant characters significantly contributing to increased yield potential of specific crops. However, knowledge on the success of induced mutations in crop improvement among geneticists and breeders is usually limited to species of their interest. The present paper contains a comprehensive list of officially released mutant varieties, based on information from plant breeders. The number of mutant varieties officially released and recorded in the FAO/IAEA Mutant Varieties Database before the end of 2000 is 2,252. Almost half of these varieties have been released during the last 15 years. Considering a significant delay in the dissemination of information on newly released varieties and difficulties in the collection of such data, there has been a renaissance in the use of mutation techniques in crop improvement. At the demand of geneticists, plant breeders, and more recently molecular geneticists, for information on released mutant varieties of specific crops, the MVD was transferred to the web site of the FAO/IAEA Joint Division. The MVD will be available on our web pages early in 2001.

ISSN 1011-2618

INTRODUCTION

The high efficiency of mutation techniques to generate desired variation in crop plants has been widely proven and documented in many original and review papers. In the approximately 70 year-old history of induced mutations, there are many examples on the development of new and valuable alteration in plant characters significantly contributing to increased yield potential of specific crops. However, knowledge on the successes of induced mutations in crops improvement among geneticists and breeders is usually limited to species of their interest. Often the breeders, using varieties with a desired character as a parent in a crossing programme, are not always aware that the desired gene was obtained by induced mutations, for example genes for semidwarfness in barley, rice and durum wheat, and high oleic fatty acid content in sunflower. The present paper contains a comprehensive list of officially released mutant varieties, based on information from plant breeders, and published in the successive issues of the Mutation Breeding Newsletter. However, the list is far from complete. Many varieties, mainly derived from crosses with parents carrying mutated genes, are published in scientific journals. However, they can only be listed in the FAO/IAEA Mutant Varieties Database (MVD) on the basis of official information obtained from the plant breeder or official authority in the country. At the demand of geneticists, plant breeders, and more recently molecular geneticists, for information on released mutant varieties of specific crops, the MVD was transferred to the web site of the FAO/IAEA Joint Division. The MVD will be available on our web pages early in 2001.

THE MUTANT VARIETIES DATABASE (MVD)

The short history of the FAO/IAEA database on mutant varieties was briefly described in the previous issue of MVD, and published in Mutation Breeding Newsletter (MBNL) 38 (1991) [1]. The idea to collect and transfer information to plant breeders on crop varieties developed with the use of mutation techniques was conceived at almost the same time as the establishment of the Plant Breeding and Genetics Section (PBG), Joint FAO/IAEA Division. B. Sigurbörnsson, the first Head of the PBG Section, began collecting data on mutant varieties in 1963. The first classified list of induced mutant varieties was presented by Sigurbjörnsson at the Pullman Symposium, and published in 1969 [2]. This work was continued over the next 22 years by A. Micke. The original information from the author and plant breeder on new, officially released mutant varieties was transferred to information sheet and kept on files. A comprehensive list of mutant varieties was published by Sigurbjörnsson and Micke in 1974 [3] and this was updated in 1985 [4]. Since the first issue of the MBNL (May, 1972) information on newly released mutant varieties was published at the end of each issue under the title “List of Mutant Varieties”. Filing and retyping the incoming information sheets for the MBNL was done first by Ms. M. Weiner and continued till 1993 by Ms. L. Halgand. In 1980, Sigurbjörnsson and then C. Konzak and B. Donini undertook the establishment of a database on mutant varieties by using mainframe facilities of the IAEA. However, fast development in personal computer technology, together with the large number of suitable software, gave opportunity to organize a database on IBM PC using “DbaseIII Plus” software. The work was initiated by M. Maluszynski in 1987, and has been continued, with the help of Ms. K. Weindl. The MVD was revised by L. van Zanten in 1994 when the Agency introduced MSAccess taking advances in the developer and user interface. On 17 November 2000, the MVD was transferred to a web based system (4D). Programming and system design was undertaken by M. Marsella (Consultant) under the leadership of I. Ferris (FAO/IAEA). Such condensed but full information on mutant varieties should help geneticists, molecular

biologists and plant breeders to asses the value of mutation techniques in germplasm enhancement, and stimulate the use of induced variation.

MUTANT VARIETIES

The number of mutant varieties officially released and recorded in MVD before the end of 2000 is 2,252 (Fig. 1). Almost half of these varieties (1,019) have been released during the last 15 years. Considering a significant delay in the dissemination of information on newly released varieties and difficulties in the collection of such data, there has been a renaissance in the use of mutation techniques in crop improvement.

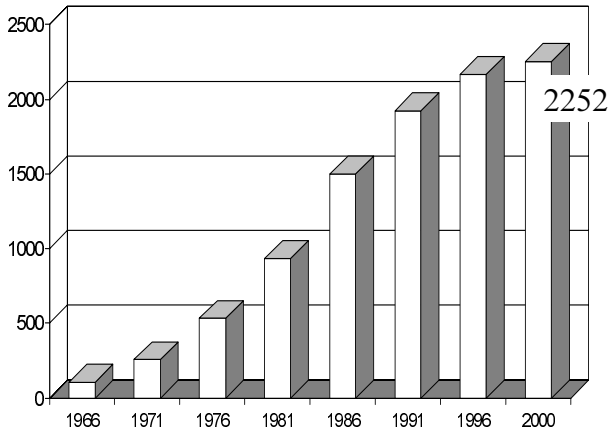

FIG. 1. Cumulative number of officially released mutant varieties, June 2000

In reality, it would be expected that the number of released varieties is much higher than listed, as many mutated genes have been used in cross breeding programmes without indicating the nature of desired genes. This is the case of at least 9 rice varieties in Australia and 2 varieties in Egypt. These varieties were developed through crosses with the gamma-ray induced semidwarf Californian rice variety "Calrose 76". The leading Australian variety "Amaroo", released in 1987, has the sd_1 gene from Carlose 76, as also the variety "Giza 176", released in 1989, and one of the leading varieties in Egypt. Both these varieties were not included in the MVD as the registration forms of these mutant varieties were not available in our files. Modern sunflower varieties or hybrids currently grown in Europe and the USA have a high oleic fatty acid content. The only known and published genetic source for this character has been a mutated gene in variety "Pervenets" developed by Soldatov in 1976 [5]. However, in the MVD only Pervenets (USSR) and “Jingkui 1” (China) were listed under sunflower mutant varieties. It should be expected that in barley, extensively used sources for semidwarfness are mutated genes and mainly *denso* gene induced by x-rays in tall Moravian variety “Valticky” [6]. Barley breeders suggest that more than 150 malting barley varieties in all continents carry the *denso* gene.

Gathering of information on newly released mutant varieties is further complicated by the fact that mutant varieties have been released in approximately sixty countries (Table 1). Additionally in most of these countries induced mutations are used for improvement of various crops, often in different plant breeding stations.

TABLE 1: Number of officially released mutant varieties listed by country

Country	Common name and number of released varieties	Total
Algeria	soybean (1)	1
Argentina	groundnut (2), lemon (1), orange (1), peach (1), wheat (1)	6
Australia	blue lupin (1), lupin (1), oat (2), serradella (1), soybean (1), subterranean clover (1)	7
Austria	apple (1), barley (9), durum (6), faba bean (1)	17
Bangladesh	black gram (1), chickpea (1), jute (1), mungbean (4), oriental mustard (3), rapeseed (2), rice (5), tomato (3), tossa jute (3)	23
Belgium	azalea (8), barley (1), chrysanthemum (7), ficus (2), guzmania (1), potato (1), red clover (1), ryegrass (1)	22
Brazil	chrysanthemum (3), common bean (3), rice (1), wheat (2)	9
Bulgaria	barley (4), durum (4), pepper (3), lentil (1), maize (8), peach (1), pepper (1), soybean (3), sweet pepper (2), tobacco (1), wheat (2)	30
Burkina Faso	rice (2)	2
Canada	apple (2), apricot (1), barley (5), begonia (2), common bean (12), flax/linseed (3), rapeseed (1), rose (2), Russian wildrye (1), sweet cherry (5), tobacco (1)	35
Chile	barley (1), wheat (1)	2
China	alfalfa (1), apple (1), barley (7), bougainvillea (2), canna lilies (4), chinese cabbage (4), chinese garlic (1), chrysanthemum (21), common bean (1), cotton (8), crown vetch (1), cucumber (1), dahlia (2), flax/linseed (3), foxtail millet (1), groundnut (29), jute (1), lotus (3), maize (42), millet (20), mulberry (6), orange/mandarin (5), pea (1), pear (5), radish (1), rapeseed (7), rice (191), rose (35), sesame (1), shadawang (5), sorghum (3), soybean (54), sugar beet (2), sugarcane (2), sunflower (1), sweet potato (4), taro (1), tea (1), watermelon (2), wheat (124), white ramie (1)	605
Costa Rica	common bean (1), cowpea (1), rice (2),	4
Cote d'Ivoire	rice (25)	25
CSFR/Czech Rep.	barley (27), common bean (1), crimson clover (1), maize (3), rose (1), soybean (1), vetch (1), mustard (1)	36
Denmark	barley (21)	21
Egypt	chickpea (1), common bean (1), sesame (2)	4
Estonia	barley (4), potato (1)	5
Finland	barley (4), oat (4), rye (2), wheat (1)	11
France	apple (5), barley (12), black currant (1), carnation (4), dahlia (5), durum (1), forsythia (2), plum (1), rice (5), weigela (3)	39
Germany/ FRG/GDR	alstroemeria (11), azalea (3), barley (44), carnation (4), chrysanthemum (34), common bean (2), faba bean (1), geranium (1), meadow fescue (3), meadow foxtail (2), ribes (1), rose (3), rye (2), snapdragon (1), soybean (1) spinach (1), streptocarpus (22), wheat (2),	138
Ghana	cassava (1)	1
Greece	barley (1), durum (1)	2
Guyana	rice (26)	26
Hungary	chrysanthemum (1), maize (1), rice (3), soybean (1), wheat (1),	7
India	barley (14), bitter gourd (1), black gram (3), bougainvillea (10), castor bean (3), chickpea (4), chinese mustard (1), chrysanthemum (46), citronella (6), common bean (1), cotton (9), cowpea (6), dahlia (11), eggplant (1), egyptian clover (1), gladiolus (2), green pepper (1), groundnut (13), hibiscus (2), hyacinth bean (1), khasianum (1), lentil (1), mulberry (1), mungbean (5), mustard (1), okra (1), opium poppy (1), oriental mustard (3),	259

	papaya (1), pea (1), pearl millet (5), pigeon pea (5), polyanthes (2), portulaca (10), portulaca per. (1), rice (40), ridged gourd (1), rose (15), sesame (3), sorghum (1), sugarcane (5), tobacco (1), tomato (4), tossa jute (3), turmeric (2), wheat (4), white jute (2), wild sage (3)	
Indonesia	mungbean (1), rice (6), soybean (3), tobacco (1)	11
Iraq	barley (7), faba bean (2), rice (3), sesame (3), tobacco (2), wheat (6)	23
Italy	almond (1), common bean (2), durum (13), eggplant (3), green pepper (1), olive (1), pea (6), potato (1), rice (1), sweet cherry (3), vetch (1), wheat (2)	35
Japan	abelia (1), apple (1), azalea (1), azuki bean (1), barley (8), begonia (6), burdock (4), carnation (1), chinese matgrass (1), chrysanthemum (14), creeping bent grass (1), eustoma (3), hibiscus (1), japanese pear (2), job's tears (1), lettuce (2), loquat (1), mat rush (2), mint (1), potato (1), rice (46), rose (3), roselle (4), soybean (6), sugarcane (1), tomato (4), turnip/jpn rape (1), wheat (2)	120
Kenya	cowpea (2)	2
Korea	barley (1), rice (2), sesame (6), soybean (2),	11
Korea, Rep.of	rice (5)	5
Malaysia	banana (1)	1
Mali	sorghum (8)	8
Mongolia	wheat (3)	3
Myanmar	groundnut (1), rice (2), tossa jute (1)	4
Netherlands	achimenes (8), african violet (1), alstroemeria (24), apple (flowers) (1), azalea (3), barley (1), begonia (6), calathea (1), carnation (7), chrysanthemum (80), dahlia (18), euphorbia (1), gladiolus (2), hyacinth (1), kalanchoe (3), lily (2), onion (2), streptocarpus (7), tulip (8)	176
Nigeria	rice (3)	3
Norway	barley (2)	2
Pakistan	chickpea (5), cotton (5), mungbean (9), rapeseed (1), rice (6), wheat (6)	32
Peru	barley (1)	1
Philippines	rice (4)	4
Poland	barley (1), blue lupin (1), chrysanthemum (6), faba bean (5), gerbera (1), pea (14), scarlet runner (1), yellow lupin (1),	30
Portugal	rice (1)	1
Romania	rice (1)	1
Russia	barley (2), millet (1), onion (1), pea (1), tulip (1)	6
Senegal	rice (2)	2
Sri Lanka	groundnut (1), rice (1), sesame (1)	3
Sweden	barley (20), mustard (3), pea (1), rapeseed (2)	26
Switzerland	wheat (1)	1
Thailand	banana (1), carnation (1), chrysanthemum (2), rice (4), soybean (1)	9
Turkey	barley (1), soybean (2)	3
UK	barley (31), streptocarpus (1)	32
Ukraine	barley (1)	1
USA	barley (13), begonia (11), bermuda grass (4), carnation (1), centipedegrass (2), chrysanthemum (1), common bean (26), crapemyrtle (2), crested wheatgrass (1), grapefruit (2), groundnut (1), hop (3), hoya (4), lespedeza (2), lettuce (3), lilac (1), oat (12), peppermint (2), rice (23), rose (2), snapdragon (3), st. Augustine grass (2), tobacco (1), wheat (3)	125
USSR	amarant (1), barley (26), brome grass (1), buckthorn (1), buckwheat (8), castor bean (1), chamomile (1), chrysanthemum (17), common bean (4), cotton (2), cress (1), cucumber (1), durra (1), faba bean (4), fig (1), flax/linseed (3), fodder beet (5), grape (1), iris (5), kale (1), lettuce (1), maize (12), millet (3), oat (3), onion (1), pea (8), pepper (1), plavine (1),	204

	pomegranate (2), poplar (1), rapeseed (2), raspberry (1), rice (6), sainfoin (2), sorghum (1), sour cherry (4), soybean (9), sudan grass (1), sunflower (1), tobacco (4), tomato (2), vetch (1), watermelon (1), wheat (36), white lupin (13), yellow lupin (2)	
Vietnam	groundnut (1), indian jujube (2), maize (2), peppermint (1), rice (18), soybean (5),	29
Yugoslavia	pepper (1)	1

In six countries, the number of released mutant varieties exceeded 100. The top countries on the list are China, India, former USSR and Russia, The Netherlands, USA and Japan (Table 2). However, the list would change if the mutant varieties developed in the former FRG and GDR (in total 138 varieties including one variety recently released in Germany) were combined.

TABLE 2: Number of officially released mutant varieties in the top six countries (total 2,252)

Country	Number of released mutant cultivars	Percent of total
China P.R.	605	26.8
India	259	11.5
USSR + Russia	210	9.3
Netherlands	176	7.8
USA	128	5.7
Japan	120	5.3

The number of mutant varieties released in China and India place Asia at the top of the regional lists. However, it is worth noting that Europe ranks second in the number of mutant varieties, very close to that released in Asia (Fig. 2). This clearly indicates that the enhancement of germplasm through induced mutation techniques is a necessary component of many current breeding programmes.

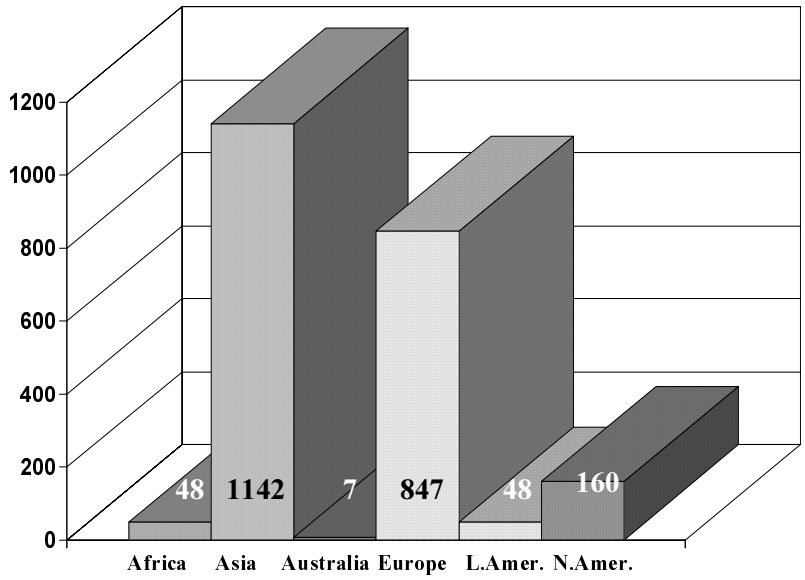

FIG. 2. Cumulative number of officially released mutant varieties in various regions of the world, June 2000.

The list of crop and plant species with induced mutant varieties is a long one and recently reached 175 entities (Table 3) as compared with 154 species in 1995 [7]. This was mainly because of an increase in the application of mutation techniques for the improvement of ornamental and decorative plants (Fig. 3A) in developing countries, where these plants have become important "cash crops". It is remarkable that the number of mutant varieties of vegetatively propagated crops (Fig. 3B) has only slightly increased in spite of the availability of many *in vitro* culture methods, which should have facilitated the development of new varieties. A new FAO/IAEA Coordinated Research Project has been established this year to identify constraints in the production of mutant varieties of fruit trees and to develop methods and protocols for more efficient use of mutation techniques and related biotechnologies. The most significant increase, compared to 1995, [8] was observed in the number of new mutant varieties in crop species (494 new), mainly in seed propagated crops (366 new mutant varieties). The distribution pattern among seed propagated crops did not change very much (Fig. 3C). Mutant varieties of cereals are on the top of the list (1072) followed by legumes (311), industrial (81), vegetables (66), oil crops (59) and other seed propagated crops (111). Significant increase was observed in the number of newly released rice and wheat mutant varieties (Fig 3D). This was mainly based on information from China, where many crop mutant varieties have been recently released. One of the next issues of Mutation Breeding Review will summarize results of the application of mutation techniques in plant breeding in China. In total there are 434 rice and 197 bread wheat accessions in MVD. Progress in the use of induced mutations for oilseed crops improvement was recently reviewed by Bhatia *et al***.** [9].

TABLE 3: Number of officially released mutant varieties in different species

Latin name	Common name	No. of mutant varieties
Abelia sp.	abelia	1
Abelmoschus esculentus (L.) Moench	okra	1
Achimenes sp.	achimenes	8
Agropyron cristatum (L.) Gaertner	crested wheat grass	1
Agrostis sp.	creeping bent grass	1
Allium cepa L.	onion	4
Allium macrostemon Bunge	chinese garlic	1
Alopecurus pratensis L.	meadow foxtail	2
Alstroemeria sp.	alstroemeria	35
Amaranthus sp.	amaranth	1
Antirrhinum sp.	snapdragon	4
Arachis hypogaea L.	groundnut	48
Arctium lappa L.	burdock	4
Astragalus huangheensis	shadawang	5
Avena sativa L.	oat	21
Begonia sp.	begonia	25
Beta vulgaris L.	fodder beet	5
Beta vulgaris L.	sugar beet	2
Boehmeria nivea (L.) Gaudich.	white ramie	1
Bougainvillea sp.	bougainvillea	12
Brassica campestris L.	turnip/jpn rape	1
Brassica juncea L.	oriental mustard	6
Brassica napus L.	rapeseed	15

Brassica oleracea (L.) var. *acephala*	kale	1
Brassica pekinensis Rupr.	chinese cabbage	4
Bromus inermis Leyss.	brome grass	1
Cajanus cajan Millsp.	pigeon pea	5
Calathea crocata	calathea	1
Camelia sinensis Kuntze	tea	1
Canna indica L.	canna lilies	4
Capsicum annuum L.	pepper	10
Carica papaya L.	papaya	1
Chrysanthemum sp.	chrysanthemum	232
Cicer arietinum L.	chickpea	11
Citrullus lanatus Mansf.	watermelon	3
Citrus limon (L.) Burm.	lemon	1
Citrus paradisi Macf.	grapefruit	2
Citrus sinensis (L.) Osbeck	orange	1
Citrus sp.	orange/mandarin	5
Coix lachryma-jobi L.	job's tears	1
Colocasia esculenta Schott.	taro	1
Corchorus capsularis L.	jute	2
Corchorus capsularis L.	white jute	2
Corchorus olitorius L.	tossa jute	7
Coronilla varia L.	crown vetch	1
Cucumis sativus L.	cucumber	2
Curcuma domestica Val.	turmeric	2
Cymbopogon winterianus Jowitt	citronella	6
Cynodon sp.	bermuda grass	4
Cyperus malaccensis Lam.	chinese matgrass	1
Dahlia sp.	dahlia	36
Dianthus caryophyllus L.	carnation	18
Dolichos lablab L.	hyacinth bean	1
Eremochloa ophuiroides Hack	centipedegrass	2
Eriobotrya japonica Lindl	loquat	1
Euphorbia fulgens Karw.	euphorbia	1
Eustoma grandiflorum (Raf.) Shinn.	eustoma	3
Fagopyrum esculentum Gili	buckwheat	8
Festuca pratensis Huds.	meadow fescue	3
Ficus benjamina exotica	ficus	2
Ficus carica L.	fig	1
Forsythia x intermedia	forsythia	2
Gerbera jamesonii Bolus	gerbera	1
Gladiolus sp.	gladiolus	4
Glycine max L.	soybean	90
Gossypium sp.	cotton	24
Guzmania paecockii Ruiz et Pav.	guzmania	1
Helianthus annuus L.	sunflower	2
Hibiscus sp.	roselle	3
Hibiscus sp.	hibiscus	4
Hippophaea rhamnoides L.	buckthorn	1
Hordeum vulgare L.	barley	269
Hoya carnosa R.Br.	hoya	4
Humulus lupulus L.	hop	3
Hyacinthus sp.	hyacinth	1
Ipomoea batatas (L.) Poir.	sweet potato	4

Iris sp.	iris	5
Juncus effusus L.	mat rush	2
Kalanchoe sp.	kalanchoe	3
Lactuca sativa L.	lettuce	6
Lagerstroemia indica L.	crapemyrtle	2
Lantana depressa	wild sage	3
Lathyrus sativus L.	plavine, grass pea	1
Lens culinaris Medik.	lentil	2
Lepidium sativum L.	cress	1
Lespedeza cuneata Dum.	lespedeza	2
Lilium sp.	lily	2
Linum usitatissimum L.	flax/linseed	7
Linum usitatissimum L.	flax	2
Lolium sp.	ryegrass	1
Luffa acutangula Roxb.	ridged gourd	1
Lupinus albus L.	white lupin	13
Lupinus angustifolius L.	blue lupin	2
Lupinus consentini Guss.	lupin	1
Lupinus luteus L.	yellow lupin	3
Lycopersicon esculentum M.	tomato	13
Malus pumila Mill.	apple	9
Malus sp.	apple (flowers)	1
Manihot esculenta (L.) Crantz	cassava	1
Matricaria chamomilla L.	chamomile	1
Medicago sativa L.	alfalfa	1
Mentha arvensis L.	peppermint	1
Mentha arvensis L.	mint	1
Momordica charantia L.	bitter gourd	1
Morus alba L.	mulberry	7
Musa sp.	banana	2
Nelumbo nucifera Gaertner	lotus	3
Nicotiana tabacum L.	tobacco	11
Olea europaea L.	olive	1
Onobrychis viciifolia Scop.	sainfoin	2
Ornithopus compressus L.	serradella	1
Oryza sativa L.	rice	434
Panicum miliaceum L.	millet	4
Papaver somniferum L.	opium poppy	1
Pelargonium grandiflorum hybrid	geranium	1
Pennisetum sp.	pearl millet	5
Phaseolus coccineus L.	scarlet runner bean	1
Phaseolus vulgaris L.	common bean	54
Pisum sativum L.	pea	32
Polyanthes tuberosa L.	polyanthes	2
Populus trichocarpa L.	poplar	1
Portulaca grandiflora L.	portulaca	10
Portulaca grandiflora L.	portulaca per.	1
Prunus armeniaca L.	apricot	1
Prunus avium L.	sweet cherry	8
Prunus cerasus L.	sour cherry	4
Prunus domestica L.	plum	1
Prunus dulcis Webb	almond	1
Prunus persica L.	peach	2

Psathyrostachys juncea (F.) Nevski	Russian wildrye	1
Punica granatum L.	pomegranate	2
Pyrus communis L.	pear	5
Pyrus pyriforia Nakai	japanese pear	2
Raphanus sativus L.	radish	1
Rhododendron simsii Planch.	azalea	2
Rhododendron sp.	azalea	13
Ribes nigrum L.	black currant	1
Ribes sp.	ribes	1
Ricinus communis L.	castor bean	4
Rosa sp.	rose	61
Rubus idaeus L.	raspberry	1
Saccharum officinarum L.	sugarcane	8
Saintpaulia sp.	african violet	1
Secale cereale L.	rye	4
Sesamum indicum L.	sesame	16
Setaria italica (L.) Beauv.	foxtail millet	1
Setaria sp.	millet	24
Sinapis alba L.	white mustard	5
Solanum khasianum Clarke	khasianum	1
Solanum melongena L.	eggplant	4
Solanum tuberosum L.	potato	4
Sorghum bicolor L.	sorghum	13
Sorghum durra Stapf	durra	1
Sorghum sudanense (Piper) Stapf	sudan grass	1
Spinacia oleracea L.	spinach	1
Stenotaphrum secundatum Kuntze	st. Augustine grass	2
Streptocarpus sp.	streptocarpus	30
Syringa vulgaris L.	lilac	1
Trifolium alexandrinum L.	egyptian clover	1
Trifolium incarnatum L.	crimson clover	1
Trifolium pratense L.	red clover	1
Trifolium subterraneum L.	subterranean clover	1
Triticum aestivum L.	wheat	197
Triticum turgidum ssp. *durum* Desf.	durum	25
Tulipa sp.	tulip	9
Vicia faba L.	faba bean	13
Vicia sativa L.	common vetch	3
Vigna angularis Willd.	azuki bean	1
Vigna mungo L.	black gram	4
Vigna radiata (L.) Wil.	mungbean	19
Vigna unguiculata Walp.	cowpea	9
Vitis vinifera L.	grape	1
Weigela sp.	weigela	3
Zea mays L.	maize	68
Ziziphus mauritiana Lam.	indian jujube	2

Of the total 2,252 mutant varieties, 1,585 were developed ‘directly’ after mutagenic treatment and selection in the subsequent generations. However, in many cases mutants or already released mutant varieties have been used as sources of desired characters in cross breeding programmes; in this way, 667 new varieties were developed. Of 1,585 directly

developed mutant varieties, a great majority (1,411) were obtained with the use of radiation as the mutagen (Table 4).

TABLE 4: Number of officially released mutant cultivars developed with different types of radiation

Type of mutagen	Number of released mutant cultivars	Percent of total
Radiation*	1411	100.00
▪ gamma rays*	910	64.49
▪ x-rays*	311	22.04
▪ gamma chronic	61	4.32
▪ fast neutrons**	48	3.40
▪ thermal neutrons	22	1.56
▪ other	24	1.70

**including various treatments*; ***including "neutrons"*

The presented MVD still needs modification and some additions especially for parental varieties used in crosses or improved by mutation characters. Readers are kindly requested to send their comments, questions, suggestions or additional information to the following address:

Dr. M. Maluszynski
Plant Breeding and Genetics Section
Joint FAO/IAEA Division
P.O. Box 100
1400 Vienna, Austria
e-mail: M.Maluszynski@iaea.org

REFERENCES

[1] Maluszynski, M., B. Sigurbjörnsson, E. Amano, L. Sitch, and O. Kamra**,** 1991. Mutant varieties - data bank, FAO/IAEA database. MBNL. **38**: 16-21

[2] Sigurbjörnsson, B. and A. Micke , 1969. Progress in mutation breeding. In: Induced Mutations in Plants. IAEA, Vienna. pp.673-698

[3] Sigurbjörnsson, B. and A. Micke , 1974. Philosophy and accomplishments of mutation breeding. In: Polyploidy and Induced Mutations in Plant Breeding. IAEA, Vienna. pp.303-343

[4] Micke, A., M. Maluszynski, and B. Donini**,** 1985. Plant cultivars derived from mutation induction or the use of induced mutants in cross breeding. Mutat.Breed.Rev. **3**: 1-92

[5] Soldatov, K. I., 1976. Chemical mutagenesis in sunflower breeding. In: Proceedings of the VIIth International Sunflower Conference. Vol. 1. Krasnodar. pp.352-357

[6] Bouma, J. and Z. Ohnoutka, 1991. Importance and application of the mutant 'Diamant' in spring barley breeding. In: Plant Mutation Breeding for Crop Improvement. Vol. 1. IAEA, Vienna. pp.127-133

[7] Maluszynski, M., B. S. Ahloowalia, and B. Sigurbjörnsson**,** 1995. Application of *in vivo* and *in vitro* mutation techniques for crop improvement. Euphytica **85**(1-3): 303-315

[8] Maluszynski, M., L. van Zanten, A. Ashri, H. Brunner, B. Ahloowalia, F. J. Zapata, and E. Weck, 1995. Mutation techniques in plant breeding. In: Induced Mutations and Molecular Techniques for Crop Improvement. IAEA, Vienna. pp.489-504

[9] Bhatia, C. R., K. Nichterlein, and M. Maluszynski**,** 1999. Oilseed cultivars developed from induced mutations and mutations altering fatty acid composition. Mut.Breed.Rev. **12**: 1-36

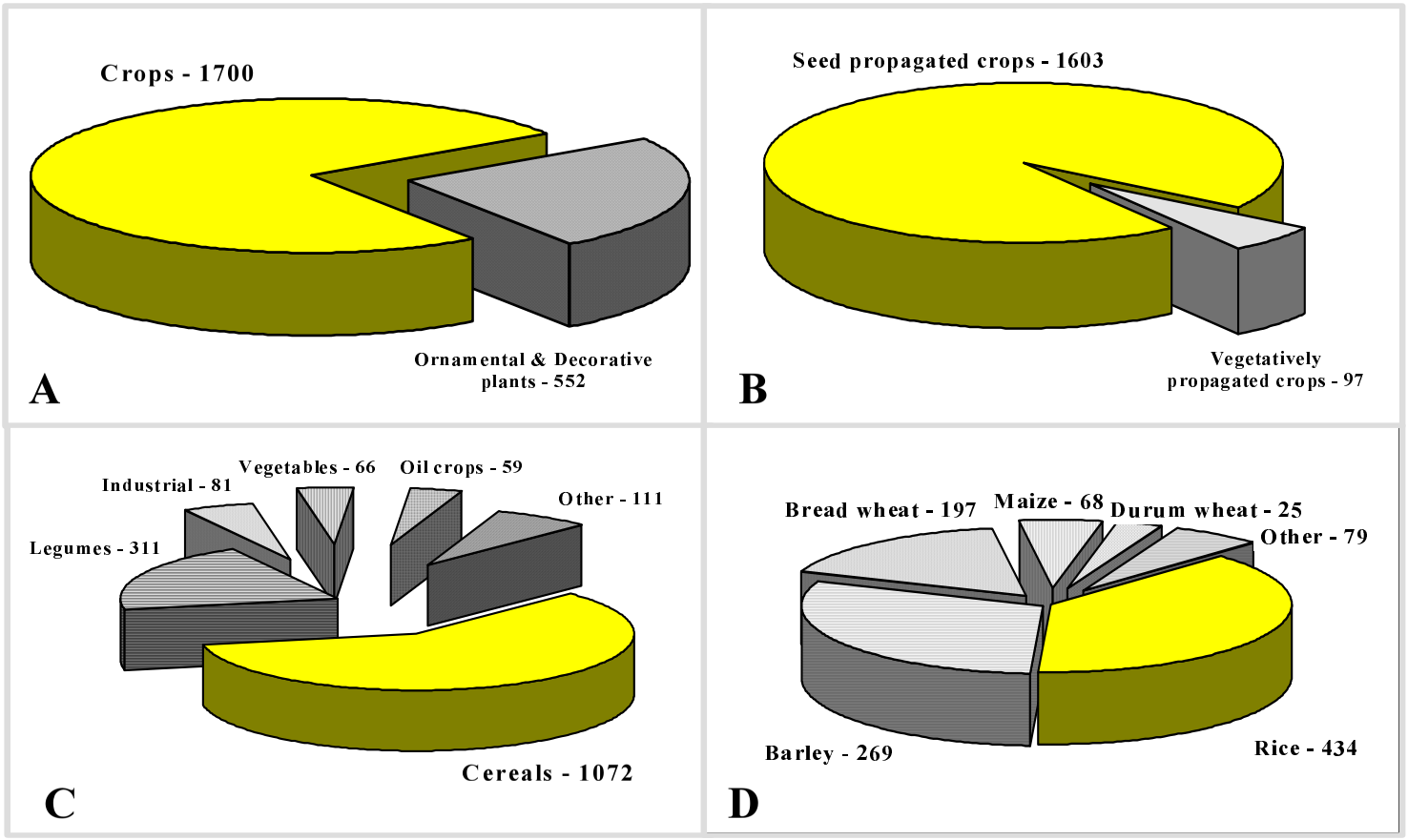

FIG. 3. Number of officially released mutant cultivars in different crop categories: A – ornamental and decorative plants; B – vegetatively propagated; C – major crops; D – major cereals.

FAO/IAEA MUTANT VARIETIES DATABASE

Latin name	Common name	Mutant variety	Country of release	Year of release	Mutagen	Parent variety	Main character induced	MBNL No.
Abelia sp.	abelia	Meifuhanatsukubaneutsu	Japan	1976	gamma rays	Hanazono-Tsukubane	variegated leaves	9
Abelmoschus esculentus	okra	MDU 2	India	1978	DES	Pusa Sawani	yield	33
Achimenes sp.	achimenes	Compact Arnold	Netherlands	1971	x-rays or fN	Paul Arnold	plant architecture	2
		Cupido	Netherlands	1973	x-rays or fN	Paul Arnold	compact growth	17
		Early Arnold	Netherlands	1971	x-rays or fN	Paul Arnold	earliness	2
		Flamingo	Netherlands	1977	x-rays	Tango	plant architecture	17
		Lollipop	Netherlands	1977	fN	Tango	compact growth	17
		Orion	Netherlands	1973	x-rays or fN	Paul Arnold	earliness	17
		Pink Attraction	Netherlands	1977	x-rays	autotetraploid of 'Repelsteeltje'	compact growth	17
		Springtime	Netherlands	1971	x-rays or fN	Paul Arnold	earliness	2
Agropyron cristatum	crested wheat grass	CD-II	USA	1996	cross		vigour	44
Agrostis sp.	creeping bent grass	Springs	Japan	1983	gamma rays	Pencross	heat tolerance	32
Allium cepa	onion	Brunette	Netherlands	1973	x-rays	Grobol	earliness	*
		Compas	Netherlands	1970	x-rays	Grobol	stiffness	1
		KIK-11	USSR	1991	cross		yield	41
		Tabys (KIK-13)	Russia	1993	ENH	Octyabr	yield	41
Allium macrostemon	chinese garlic	Ningsuan 1	China	1990	gamma rays	landrace	yield	n.i.
Alopecurus pratensis	meadow foxtail	Alko	FRG	1983	gamma rays		seed retention	34
		Limosa	FRG	1984	gamma rays		seed retention	34
Alstroemeria sp.	alstroemeria	Appelbloesem	Netherlands	1979	x-rays	King Cardinal	flower colour	31
		Atlas	Netherlands	1984	x-rays	Red Sunset	flower colour	31
		Audino	GDR	1979	gamma rays		earliness	37
		Canaria	Netherlands	1970	x-rays	Orchid Flower	flower colour	*
		Capitol	Netherlands	1977	x-rays	Carmen	flower colour	17
		Chimbotina	GDR	1981	gamma rays		flower colour	37
		Fanfare	Netherlands	1977	x-rays	Carmen	flower colour	17
		Harlequin	Netherlands	1973	x-rays	Paringo's Charm	flower colour	17
		Harmony stabrons	Netherlands	1972	x-rays	Regina	flower colour	17
		Jacqueline	Netherlands	1979	x-rays	Rosario	flower size	31

		Kolibri Blau	GDR	1989	gamma rays		flower colour	37
		Kolibri Gelb	GDR	1989	gamma rays		flower colour	37
		Kolibri Orange	GDR	1989	gamma rays		flower colour	37
		Kolibri Rosa	GDR	1989	gamma rays		flower colour	37
		Kolibri Rot	GDR	1989	gamma rays		flower colour	37
		La Paz	Netherlands	1984	x-rays	Rio	flower colour	31
		La Poza	GDR	1981	gamma rays		flower colour	37
		Lilac Glory	Netherlands	1979	x-rays	Rosario	flower colour	31
		Patricia	Netherlands	1983	x-rays	Pink Triumph	flower colour	31
		Pink Panther	Netherlands	1978	x-rays	Rosario	tallness	31
		Pink Tiger	Netherlands	1983	x-rays	Pink Panther	flower colour	31
		Purple Joy	Netherlands	1979	x-rays	Carmen	flower colour	31
		Quitona	GDR	1981	gamma rays		flower colour	37
		Red Sunset	Netherlands	1979	x-rays		flower colour	14
		Result	Netherlands	1977	x-rays	Carmen	flower colour	17
		Rosali staliro	Netherlands	1975	x-rays	Starosa	flower colour	17
		Rosita stareza	Netherlands	1972	x-rays	Regina	flower colour	17
		Trident	Netherlands	1977	x-rays	Carmen	flower colour	17
		Tucumana	GDR	1981	gamma rays		flower colour	37
		Valiant	Netherlands	1977	x-rays	Carmen	flower colour	17
		Valparaisa	GDR	1981	gamma rays		flower colour	37
		White Wings	Netherlands	1971	x-rays	Orchid Flower	flower colour	2
		Yellow Tiger	Netherlands	1970	x-rays	Orchid Flower	flower colour	*
		Zebra stazeb	Netherlands	1975	x-rays	Orchid Flower	flower colour	17
		Zenith	Netherlands	1977	x-rays	Carmen	flower colour	17
Amaranthus sp.	amaranth	Sterkh	USSR	1992	chemical	[A.panic.x A.nutans]	drought tolerance	41
Antirrhinum sp.	snapdragon	Antirrhinum Juliva	FRG	1961	cross		flower	7
		Bright Butterflies	USA	1966	cross	Antirrhinum divaricata	flower	7
		Little Darling	USA	1966	cross	Antirrhinum divaricata	flower	7
		Madame Butterfly	USA	1966	cross	Antirrhinum divaricata	flower	7
Arachis hypogaea	groundnut	78961	China	1988	cross		earliness	37
		8130	China	1988	cross		seed quality	44
		ANK-G1 (Tissa)	Sri Lanka	1995	gamma rays	Vietnam	yield	43

B 5000	Vietnam	1985	gamma rays	Bacta	seed size	31
BP-1	India	1979	gamma rays	41-C	seed size	31
BP-2	India	1979	gamma rays	41-C	seed size	32
Changhua 4	China	1972	gamma rays	Fuhuasheng	earliness	27
Co 2	India	1984	EMS	Pol-1	yield	26
Colorado Irradiado	Argentina		x-rays	Colorado de Cordoba	yield	7
Fu 21	China	1986	gamma rays	Yueyou 22	yield	29
Fu 22	China	1985	gamma rays		*A. flavus*	37
Ganhua 1	China	1990	gamma rays	Yueyou 551-11	earliness	41
Huayu 16	China	1996	gamma rays		yield	44
Lainong 10	China	1984	laser		earliness	37
Lu 8130	China	1993	cross		pod size	n.i.
Luhua 11	China	1992	laser	hybrid	yield	n.i.
Luhua 13	China	1991	cross		yield	44
Luhua 15	China	1994	cross		seed quality	44
Luhua 6	China	1986	gamma rays	Baisha 1016	earliness	34
Luhua 7	China	1986	gamma rays	Linhua 1	logging resistance	32
MH-2	India	1973	gamma rays		yield	37
N.C.4-X	USA	1959	x-rays	N.C. 4	hull toughness	*
P12	China	1986	cross		yield	37
Shanyou 27	China	1985	cross		uniform	37
Sin Pa detha 1	Myanmar	1982	gamma rays	Magwe-10	earliness	20
SOMNATH	India	1989	cross		earliness	41
TAG-24	India	1991	cross		earliness	41
TG 17	India	1977	x-rays	Spanish Improved	yield	12
TG 3	India	1973	x-rays	Spanish Improved	pod number	12
TG 4	India	1976	x-rays	Spanish Improved	uniform maturity	12
TG-22	India	1994	cross		yield	44
TG-26	India	1996	cross		yield	44
TKG-19A	India	1996	cross		seed size	44
Vikram	India	1973	x-rays	Spanish Improved	seed size	11
Virginia No.3	Argentina	1979	radiation	N.C. 2	pod size	30
Xianghua 1	China	1985	cross		earliness	41

		Xianghuasheng 4	China	1996	gamma rays	Xianghuasheng 2	yield	n.i.
		Yangxuan 1	China	1978	cross			37
		Yeuyou 22	China	1968	cross		dwarfness	25
		Yuexuan 58	China	1978	cross		yield	37
		Yueyou 169	China	1980	cross		plant architecture	37
		Yueyou 187	China	1981	cross		tallness	37
		Yueyou 187-93	China	1982	cross		tallness	37
		Yueyou 33	China	1971	cross		yield	37
		Yueyou 551	China	1972	cross		dwarfness	25
		Yueyou 551-116	China	1975	cross		yield	37
		Yueyou 551-38	China	1975	cross		yield	37
		Yueyou 551-6	China	1975	cross		yield	37
Arctium lappa	burdock	Kobaruto-gokuwase	Japan	1981	gamma rays	Yanagawa-nakate	earliness	21
		Kobaruto-okute	Japan	1981	gamma rays	Yanagawa-nakate	lateness	21
		Kobaruto-wase	Japan	1981	gamma rays	Yanagawa-riso	earliness	21
		Tsuneyutaka	Japan	1986	gamma rays	Yanagawa-risou	thick root	33
Astragalus huangheensis	shadawang	Heifu 2	China	1987	gamma rays	domesticated Shadawang	earliness	n.i.
		Heifu 21	China	1987	gamma rays	domesticated Shadawang	earliness	n.i.
		Heifu 4	China	1987	laser	domesticated Shadawang	earliness	n.i.
		Penyangzaoshudawang	China	1991	gamma rays	Liaoningshadawang	earliness	n.i.
		Zaoshushadawang	China	1983	gamma rays	Shadawang	earliness	31
Avena sativa	oat	Alamo-X	USA	1961	x-rays	Alamo	blight resistance	*
		Bates	USA	1977	cross		shortness	14
		Bay	USA	1995	cross		disease resistance	44
		Belle	USA	1995	cross		disease resistance	44
		Belozernii	USSR	1979	NMH	Orel	shortness	13
		Bob	USA	1977	cross		yield	14
		Centennial	USA	1987	cross		rust resistance	42
		Dolphin	Australia	1984	cross		shortness	28
		Echidna	Australia	1984	cross		shortness	28
		Florad	USA	1959	thN	Floriland	rust resistance	*
		Florida 500	USA	1965	cross		rust resistance	*
		Florida 501	USA	1967	cross		plant type	*

		Gem	USA	1996	cross		disease resistance	44
		Horicon	USA	1990	cross		crown rust	42
		Nasta	Finland	1970	cross		earliness	20
		Ozark	USA	1991	cross		winter hardiness	42
		Puhti	Finland	1978	cross		yield	25
		Ryhti	Finland	1970	cross		yield	*
		Sir-4	USSR	1988	diazoacetylbut	Selma	adaptability	31
		Veli	Finland	1981	cross		yield	32
		Zelonyi	USSR	1976	NEU	Krasnodarskii 73	plant type	13
Begonia sp.	begonia	Aphrodite Joy	USA	1974	gamma rays	Aphrodite Rose	flower colour	17
		Aphrodite Peach	USA	1974	gamma rays	Aphrodite Rose	flower colour	17
		Aphrodite Twinkles	USA	1974	gamma rays	Aphrodite Rose	dwarfness	17
		Big-Cross	Japan	1976	gamma rays	Iron Cross	leaf morphology	9
		Elegance	USA	1975	gamma rays	Aphrodite Rose	double flowers	17
		Enchantress	USA	1974	gamma rays	Aphrodite Rose	flower	17
		Fantasy	USA	1975	gamma rays	Aphrodite Rose	plant architecture	17
		Flambeau	USA	1976	fN	Aphrodite Red	flower	17
		Gin-Sei	Japan	1976	gamma rays	Winter Queen	leaf colour	9
		Heirloom	USA	1975	fN	Schwabenland Pink	flower colour	17
		Hoblanche	Netherlands	1977	x-rays	Vuurgloed	flower colour	17
		Kaede-Iron	Japan	1976	gamma rays	Iron Cross	leaf morphology	9
		Manilla	Netherlands	1983	gamma rays	Grete	flower colour	31
		Manita	Netherlands	1986	gamma rays	Grete	flower colour	31
		Manolito	Netherlands	1986	gamma rays	Grete	flower colour	31
		Mikkel Limelight	USA	1974	fN	Aphrodite Rose	vigour	17
		Mini-Mini-Iron	Japan	1976	gamma rays	Iron cross	plant architecture	9
		Northern Sunset	Canada	1975	x-rays	Renaissance	flower petal	12
		Orange-Iron	Japan	1976	gamma rays	Iron Cross	flower colour	9
		Red Elegance	USA	1975	gamma rays	Aphrodite Rose	flower	17
		Rose Elegance	USA	1975	gamma rays	Aphrodite Rose	flower	17
		Ryoku-Ha	Japan	1976	gamma rays	Winter Queen	leaf morphology	9
		Saanred	Canada	1983	x-rays	Renaissance	flower colour	31
		Tiara	Netherlands	1974	radiation	Clone S01	flower colour	7

		Turo	Netherlands	1973	x-rays	Clone Le1	flower	7
Beta vulgaris	fodder beet	Timiryazevskaya	USSR	1988	chemical	Ekkendorfer	yield	31
		Tymiryazevskaya 87	USSR	1992	gamma rays		yield	41
		Tymiryazevskaya odnos	USSR	1988	EI		yield	41
		Tymiryazevskaya okrug	USSR	1991	EI	hybrid	yield	41
		Umanskii polusakharnyi	USSR	1990	cross		white rhizocarp	41
Beta vulgaris	sugar beet	Tianyan 301	China	1986	cross		quality	n.i.
		Tianyan 302	China	1989	cross		yield	n.i.
Boehmeria nivea	white ramie	Xiangzhu 2	China	1987	gamma rays	Xiangzhu 1	yield	n.i.
Bougainvillea sp.	bougainvillea	Arjuna	India	1976	gamma rays	Partha	variegated leaves	15
		Jaya	India	1977	gamma rays	Jayalakshmi	ornamental type	20
		Jayalaxmi Variegata	India	1977	gamma rays	Jayalakshmi	ornamental type	14
		Lady Hudson of C.V.	India	1979	gamma	Lady Hudson of Ceylon	ornamental type	20
		Los Banos Variegata	India	1990	gamma rays	Los Baños beauty	leaf colour	37
		Mahara variegata	India		gamma rays	Mahara	variegated leaves	43
		Pallavi	India	1986	gamma rays	Roseville's Delight	variegated leaves	31
		Poultoni Variegata	India	1981	gamma rays	Poultoni	variegated leaves	33
		Silver Top	India	1978	gamma	Versicolour	ornamental type	20
		Suicheng 85-2	China	1990	gamma rays	Meiguihong	flower colour	n.i.
		Suvarna	India	1981	gamma	Lady Hudson / Ceylon	flower colour	33
		Yuehong 85-1	China	1990	gamma rays	Meiguihong	flower colour	n.i.
Brassica campestris	turnip/jpn rape	Haya-natane	Japan	1961	colchicine	Michinoku-natane	yield	21
Brassica juncea	chinese mustard	RL 1359	India	1987	cross		earliness	31
	oriental mustard	Agrani	Bangladesh	1991	gamma rays	YS-52	earliness	42
		RLM 514	India	1980	gamma rays	RL-18	yield	17
		Safal	Bangladesh	1991	gamma rays	Line YS 52	yield	42
		Shambal (BAU-M/248)	Bangladesh	1984	EMS	BAU-M/14	shortness	34
		TM-2	India	1978	x-rays	RL-9	pod morphology	43
		TM-4	India	1978	cross		seed colour	43
Brassica napus	rapeseed	Abasin-95	Pakistan	1995	gamma rays	Tower	earliness	44
		Binasharisha-3	Bangladesh	1997	gamma rays		oil content	44
		Binasharisha-4	Bangladesh	1997	gamma rays		oil content	44
		Ganyu 5	China	1977	gamma rays	Shengliyoucai	cold tolerance	32

		Huahuang 1	China	1980	gamma rays		viability	41
		Huyou 4	China	1970	gamma rays	Shengliqinggeng	lodging resistance	27
		Ivanna	USSR	1990	MNH	Jet-Nef	oil content	41
		Regina varraps el. A	Sweden	1953	x-rays	Svalöf's Regina	yield	*
		Regina varraps el. F	Sweden	1962	x-rays	Svalöf's Regina	yield	*
		Stellar	Canada	1987	cross		oil quality	33
		Tismenitskii	USSR	1989	MNH	Gloria	oil content	41
		Xiangyou 11	China	1987	cross		stress tolerance	n.i.
		Xinyou 1	China	1979	gamma rays	Baichenghuangyoucai	seedling growth	27
		Xiuyou 1	China	1978	gamma rays	[Chuannongchangjiao x Qianyou 23]	earliness	32
		Zheyou 7	China	1983	cross		earliness	n.i.
Brassica oleracea var. *acephala*	kale	Vekha	USSR	1990	chemical	Mozgovaya zel.vol.	disease resistance	41
Brassica pekinensis	chinese cabbage	Baicai 9	China	1978	gamma rays	Keer x Feichenghuabai	earliness	25
		Longbai 1	China	1984	gamma rays	F4 line (Jiaoerye x Tongnong)	earliness	30
		Longfuerniuxin	China	1991	gamma rays	Xinnongerniuxin	disease resistance	n.i.
		Longxiebai 1	China	1992	cross		earliness	n.i.
Bromus inermis	brome grass	Fakel 89	USSR	1989	DMS	Morshanskii 760	winter hardiness	41
Cajanus cajan	pigeon pea	Co 3	India	1977	EMS	Co 1	yield	29
		Co 5	India	1984	gamma rays	Co 1	earliness	29
		TAT 10	India	1985	cross		seed size	28
		TAT 5	India	1984	fN	T-21	seed size	28
		Trombay Vishakha-1	India	1982	fN	T-21	seed size	23
Calathea crocata	calathea	Esther	Netherlands	1987	x-rays		flower petal	31
Camelia sinensis	tea	Fufeng	China	1997	gamma rays	Fudingdabeicha	yield	n.i.
Canna indica	canna lilies	Caixiao	China	1986	gamma rays	Dahonghua (root)	flower colour	32
		Caixui	China	1986	gamma rays	Dahonghua (root)	flower colour	32
		Huamei 1	China	1986	gamma rays		flower colour	n.i.
		Xuhong	China	1986	gamma rays	Dahonghua (root)	flower colour	32
Capsicum annuum	green pepper	Albena	Bulgaria	1976	gamma rays	Zlaten medal	fruit morphology	16
		Friari KS80	Italy	1985	EMS		semi-dwarfness	37
		Gornooriahovska kapia	Bulgaria	1997	cross		earliness	44
		Horgoska slatki-X-3	Yugoslavia	1974	gamma rays		fruit quality	33

		Krichimsky ran	Bulgaria	1972	x-rays	Pasardjishka kapia	yield	12
		Ljulin	Bulgaria	1982	cross		hybrid variety	20
		MDU.1	India	1976	gamma rays	K-1	compact growth	10
		Nush-51	USSR	1991	EI	Lastochka	yield	41
		Orangeva Kapia	Bulgaria	1991	x-rays	Pasardjshka kapia	beta carotene	41
		Pirin	Bulgaria	1991	gamma rays	Kurtovska kapia	powdery mildew	41
Carica papaya	papaya	Pusa nanha	India	1986	gamma rays	Ranchi	shortness	30
Chrysanthemum sp.	chrysanthemum	Agnisikha	India	1987	gamma rays		flower colour	37
		Alankar	India	1982	gamma rays	D-5	flower colour	23
		Amber Boston	Netherlands	1978		Pink Boston	flower colour	16
		Anamika	India	1975	gamma rays	E-13	flower colour	15
		Angshoujingshi	China	1989	gamma rays	Fengsehuan	flower colour	n.i.
		Apricot Deholta	Netherlands	1983	x-rays	Delta	flower colour	31
		Apricot Impala	Netherlands	1984	x-rays	Impala	flower colour	31
		Aruna	India	1974	gamma rays	Undaunted	flower colour	15
		Asha	India	1975	gamma rays	Hope	flower colour	15
		Ashankit	India	1974	gamma rays	Undaunted	flower	15
		Babette Gelb	FRG	1988	x-rays	Babette (white)	flower colour	31
		Baiogiku rainb. red	Japan	1985	gamma rays	Seikouno-kurnenai	flower colour	32
		Baiogiku rainb.orang	Japan	1985	gamma rays	Seikouno-kurnenai	flower colour	32
		Baiogiku rainb.peach	Japan	1985	gamma rays	Seikouno-kurnenai	flower colour	32
		Baiogiku rainb.pink	Japan	1985	gamma rays	Seikouno-kurnenai	flower colour	32
		Baiogiku rainb.white	Japan	1985	gamma rays	Seikouno-kurnenai	flower colour	32
		Baiogiku rainb.yello	Japan	1985	gamma rays	Seikouno-kurenai	flower colour	32
		Baiyunyong	China	1991	gamma rays	Changfengwanli	flower type	n.i.
		Basant	India	1975	gamma rays	Paul	flower colour	15
		Basanti	India	1979	gamma rays	E-13	flower colour	23
		Batik	India	1994	gamma rays	Flirt	flower colour	43
		Blue Redemine	Netherlands	1984	x-rays	Redemine	flower colour	31
		Blue Star	Netherlands	1977	x-rays	Pink Star	flower colour	16
		Blue Winner	Netherlands	1975	x-rays	Pink Winner	flower colour	15
		Bright Lameet	Netherlands	1978	x-rays	Lameet	flower colour	14
		Bright Star	Netherlands	1977	x-rays	Pink Star	flower colour	16

Bright Westland	Netherlands	1976	x-rays	Westland	flower colour	15
Bronce Kalinka	FRG	1987	x-rays	Kalinka	flower colour	35
Bronze Byoux	Netherlands	1985	gamma rays	Byoux	flower colour	31
Bronze Charmette	Netherlands	1976	x-rays	Charmette	flower colour	15
Bronze Clinspy	Netherlands	1978	x-rays	Clinspy	flower colour	14
Bronze Miros	Netherlands	1979	x-rays	Miros	flower colour	16
Bronze Redemine	Netherlands	1986	x-rays	Redemine	flower colour	31
Bronze Star	Netherlands	1977	x-rays	Pink Star	flower colour	16
Bronze Westland	Netherlands	1976	x-rays	Westland	flower colour	15
Bronze Winner	Netherlands	1975	x-rays	Pink Winner	flower colour	15
Cherry Deholta	Netherlands	1985	x-rays	Dark Delta	flower colour	31
Chongyangshaoyao	China	1989	gamma rays	Saishaoyao	flower colour	n.i.
Chuntao	China	1991	gamma rays	Zihe	flower colour	n.i.
Colchi Bahar	India	1985	colchicine	Sharad Bahar	flower colour	31
Copper Marconi	Belgium	1985	x-rays	Marconi	flower colour	31
Coral Refla	Netherlands	1986	x-rays	Refla	flower colour	31
Coral Winner	Netherlands	1975	x-rays	Pink Winner	flower colour	15
Cosmonaut	India	1984	gamma rays	Nimrod	flower	26
Cream Clingo	Netherlands	1979	x-rays	Clingo	flower colour	14
Cream Deholta	Netherlands	1985	x-rays	Deholta	flower colour	31
Cream Impala	Netherlands	1984	x-rays	Impala	flower colour	31
Cristiane	Brazil	1995	gamma rays	Repin	flower colour	43
Dalekaya zoezda	USSR	1976	gamma rays	Violet Colour	flower colour	14
Danny Boy	Netherlands	1973	x-rays	Beamsville Pink	flower colour	15
Danny's Cape	Netherlands	1973	x-rays	Beamsville Pink	flower colour	15
Danny's Pearl	Netherlands	1973	x-rays	Beamsville Pink	flower colour	15
Dark Charmette	Netherlands	1976	x-rays	Charmette	flower colour	15
Dark Deep Tuneful	Netherlands	1969	x-rays	Tuneful	flower colour	15
Dark Gaby	FRG	1988	x-rays	Gaby (pink)	flower colour	31
Dark Lymon	Netherlands	1985	x-rays	Lymon	flower colour	31
Dark Mario	FRG	1983	x-rays	Mario (pink)	flower colour	23
Dark Miros	Netherlands	1979	x-rays	Miros	flower colour	16
Dark Oriette	Netherlands	1976	x-rays	Oriette	flower colour	15

Dark Red Marconi	Belgium	1985	x-rays	Marconi	flower colour	31
Dark Torino	Belgium	1985	x-rays	Torino	flower colour	31
Dark Westland	Netherlands	1976	x-rays	Westland	flower colour	15
Dark/Royal Rendez-Vo	Netherlands	1986	gamma rays	Rendez-Vous	flower colour	31
Dr. X	USA	1966	x-rays	Dr. Dave	flower colour	*
Enzett Axillia Gelb	GDR	1988	gamma rays		flower colour	37
Enzett Balina Rot	GDR	1985	gamma rays		flower colour	37
Enzett Balina Weiss	GDR	1985	gamma rays		flower colour	37
Enzett Dilana Gelb	GDR	1977	gamma rays		flower colour	37
Enzett Dilana Rosa	GDR	1979	gamma rays		flower colour	37
Enzett Heli Bronze	GDR	1987	gamma rays		flower colour	37
Enzett Heli Gelb	GDR	1987	gamma rays		flower colour	37
Enzett Mellit Gelb	GDR	1989	gamma rays		flower colour	37
Enzett Minos Bronze	GDR	1985	gamma rays		flower colour	37
Enzett Niva Bronze	GDR	1984	gamma rays		flower colour	37
Enzett Niva Gelb	GDR	1983	gamma rays		flower colour	37
Enzett Niva Lachs	GDR	1984	gamma rays		flower colour	37
Franky Lane	Netherlands	1985	gamma rays		flower colour	13
Fuchengzao	China	1987	gamma rays	Jiangchengluoxia	photoperiod	n.i.
Funny Redemine	Netherlands	1984	x-rays	Redemine	flower colour	31
Funny Rendez-Vous	Netherlands	1986	gamma rays	Rendez-Vous	flower colour	31
Gairik	India	1974	gamma rays	Belur Math	flower colour	15
Gamma	Hungary	1969	gamma rays	Obuda		15
Goldbronze Deholta	Netherlands	1983	x-rays	Deholta	flower colour	31
Golden Byoux	Netherlands	1985	gamma rays	Byoux	flower colour	31
Golden Clingo	Netherlands	1979	x-rays	Clingo	flower colour	14
Golden Cremon	Thailand	1987	gamma rays, *in vitro*	Cremon	flower colour	34
Golden Deholta	Netherlands	1984	x-rays	Deholta	flower colour	31
Golden Geos	FRG	1984	x-rays	Geos	flower colour	35
Golden Luck	FRG	1988	x-rays	Luck	flower colour	31
Hemanti	India	1979	gamma rays	megami	flower colour	16
Himani	India	1974	gamma rays	E-13	flower colour	15
Hoof Lane	Netherlands	1985	gamma rays	Penny Lane	flower colour	31

Huangjuanyun	China	1991	gamma rays	Chuntao	flower colour	n.i.
Indianapolis Yel.Imp	Netherlands	1970	x-rays	Indianapolis Yellow	flower colour	*
Ingrid	Brazil	1995	gamma rays	Repin	flower colour	43
IRB 88-30	Japan	1991	gamma rays	Taihei	flower colour	43
IRB 88-47	Japan	1991	gamma rays	Taihei	flower colour	43
IRB 88-59	Japan	1991	gamma rays	Taihei	flower colour	43
IRB 88-60	Japan	1991	gamma rays	Taihei	flower colour	43
Izetka Filmstar Br.	GDR	1966	x-rays	Filmstar	flower colour	*
Izetka Herbstgold	GDR	1964	x-rays	Izetka Kopenicker Rayonnante	flower colour	*
Izetka Kop.Barb.Gold	GDR	1962	x-rays	Barbarossa	flower colour	*
Izetka Kop.Barb.Rot	GDR	1962	x-rays	Barbarossa	flower colour	*
Izetka Kop.Br.Vogue	GDR	1962	x-rays	Vogue	flower colour	*
Izetka Ma.Cremeweiss	GDR	1966	x-rays	Izetka Marienhain	flower colour	*
Izetka Ma.Dunkelrosa	GDR	1966	x-rays	Izetka Marienhain	flower colour	*
Izetka Ma.Hellgelb	GDR	1966	x-rays	Izetka Marienhain	flower colour	*
Jhalar	India	1975	gamma rays	Undaunted	flower	15
Jingguangsishe	China	1989	gamma rays	Wuguangshise	flower colour	n.i.
Jingsuiqiu	China	1989	gamma rays	011	flower petal	n.i.
Jugnu	India	1991	gamma rays	Lalima	flower colour	43
Kanak	India	1975	gamma rays	Undaunted	flower colour	15
Kansya	India	1974	gamma rays	Rose Day	flower colour	15
Kapish	India	1974	gamma rays	E-13	flower colour	15
Ki-uzushio	Japan	1985	gamma rays	Uzushio	flower colour	32
Kraski oseni	USSR	1976	gamma rays	Violet colour	flower colour	14
KU 1	Thailand	1988	gamma rays, *in vitro*	Hangzhou	flower size	34
Kumkum	India	1982	gamma rays	M-71	flower colour	31
Kunchita	India	1974	gamma rays	Undaunted	flower	15
Lady Amber	Poland	1993	x-rays	Richmond	flower colour	43
Lady Bronze	Poland	1993	x-rays	Richmond	flower colour	43
Lady Pink	Poland	1993	gamma rays	Richmond	flower colour	43
Lady Rosy	Poland	1993	x-rays	Richmond	flower colour	43
Lady Salmon	Poland	1993	gamma rays	Richmond	flower colour	43
Lady Yellow	Poland	1993	gamma rays	Richmond	flower colour	43

Lemon Deholta	Netherlands	1985	x-rays	White Delta	flower colour	31
Liangjihuang	China	1989	gamma rays	Yaohong (leaf callus)	flower colour	n.i.
Lilac Byoux	Netherlands	1985	gamma rays	Byoux	flower colour	31
Lilac Cindy	FRG	1988	x-rays	Cindy	flower colour	35
Lohita	India	1974	gamma rays	E-13	flower colour	15
Main Lane	Netherlands	1985	gamma rays	Penny Lane	flower colour	31
Man Bhawan	India	1982	gamma rays	Flirt	flower colour	23
Mantianxin	China	1990	gamma rays	104 Ju	flower colour	n.i.
Marconi	Belgium	1985	x-rays	Pink cultivar	flower colour	31
Mars	USSR	1976	gamma rays	Privet Zime	flower colour	14
Merkurii	USSR	1976	gamma rays	Privet Zime	flower colour	14
Middelry	Netherlands	1976	x-rays	Horim	flower colour	15
Mikrop	Netherlands	1976	x-rays	Horim	flower colour	15
Milava	Netherlands	1976	x-rays	Horim	flower colour	15
Milonka	Netherlands	1976	x-rays	Horim	flower colour	15
Mirazh	USSR	1976	gamma rays	Lilac-pink	flower	14
Miros	Netherlands	1978	x-rays	Mikrop	flower colour	16
Mlechnyi put	USSR	1976	gamma rays	Privet Zime	flower colour	14
Morning Sun	Netherlands	1978	x-rays	Evening Sun	flower colour	16
Navneet	India	1987	gamma rays	Kalyani Mauve	flower colour	37
Navneet Yellow	India	1993	gamma rays	Navneet	flower colour	43
Nirbhaya	India	1975	gamma rays	Undaunted	flower	15
Nirbhik	India	1975	gamma rays	Undaunted	flower	15
OHB-14	Japan	1991	gamma rays chronic	Taihei	flower colour	43
OHB-8	Japan	1991	gamma rays chronic	Taihei	flower colour	43
Orange Impala	Netherlands	1984	x-rays	Impala	flower colour	31
Orange Lymon	Netherlands	1985	x-rays	Lymon	flower colour	31
Orange Mario	FRG	1983	x-rays	Mario (pink)	flower colour	23
Orange Miros	Netherlands	1979	x-rays	Miros	flower colour	16
Orange Refla	Netherlands	1985	x-rays	Refla	flower colour	31
Orion	USSR	1976	gamma rays	Charodeika	flower colour	14
Pale Remember	Netherlands	1985	gamma rays	Remember	flower colour	31

Peach Deholta	Netherlands	1985	x-rays	Pearl delta	flower colour	31
Pearl Cindy	FRG	1989	x-rays	Lilac Cindy	flower colour	35
Pingal	India	1974	gamma rays	Pink Casket	flower colour	15
Pink Clinspy	Netherlands	1978	x-rays	Clinspy	flower colour	14
Pink Impala	Netherlands	1984	x-rays	Impala	flower colour	31
Pink-Orizuru	Japan	1989	gamma rays	Sei-Orizuru	flower colour	42
Pitaka	India	1978	gamma rays	Kansya	flower colour	14
Pitambar	India	1978	gamma rays	Otome-Zakura	flower colour	14
Plutonii	USSR	1976	gamma rays	Privet zime	flower colour	14
Privet Frantsii	USSR	1976	gamma rays	Excellence	flower colour	14
Purnima	India	1978	gamma rays	Otome-Zakura	flower colour	14
Radii	USSR	1976	gamma rays	Springdawn at Suti dam	flower colour	14
Raktima	India	1998	gamma rays	Shyamal	flower colour	44
Red Lymon	Netherlands	1985	x-rays	Lymon	flower colour	31
Red Marconi	Belgium	1985	x-rays	Pink cultivar	flower colour	31
Repin Rosa	Brazil	1996	gamma rays		flower colour	44
Rohit	India	1979	gamma rays	Kingsford Smith	flower colour	16
Salmon Byoux	Netherlands	1985	gamma rays	Byoux	flower colour	31
Salmon Impala	Netherlands	1984	x-rays	Impala	flower colour	31
Salmon Lymon	Netherlands	1985	x-rays	Lymon	flower colour	31
Saturn	USSR	1976	gamma rays	Charodeika	flower colour	14
Selena	USSR	1976	gamma rays	Springdawn at Suti dam	flower colour	14
Shabnam	India	1987	gamma rays	D-5	flower colour	31
Shafali	India	1975	gamma rays	Undaunted	flower colour	15
Sharad Har	India	1992	gamma rays	Sharad Mala	flower colour	43
Sheela	India	1985	gamma rays	Himani	flower colour	31
Shukla	India	1974	gamma rays	Mrs. H. Gubby	flower colour	15
Shveta	India	1974	gamma rays	Fish tail	flower colour	15
Sijifeng	China	1989	gamma rays	Yaohong	flower colour	
Sijihong	China	1989	gamma rays	Yaohong	flower colour	n.i.
Sijihuang	China	1989	gamma rays	Yaohong	flower colour	n.i.
Sijimohong	China	1986	gamma rays	Yaohong	flower colour	n.i.
Sointse	USSR	1976	gamma rays	Modnitsa	flower colour	14

Sonali	India	1990	gamma rays	Ratna	flower colour	42
Sputnik	USSR	1976	gamma rays	Charodeika	flower colour	14
Subarna	India	1990	gamma rays	Flirt	flower colour	42
Surekha Yellow	India	1992	gamma rays	Surekha	flower colour	42
Svarnim	India	1975	gamma rays	Undaunted	flower colour	15
Tamra	India	1974	gamma rays	Goldie	flower colour	15
Taruni	India	1979	gamma rays	Kingsford Smith	flower colour	17
Torino	Belgium	1985	x-rays	Pink seedling	flower colour	31
Tsezii	USSR	1976	gamma rays	Charodeika	flower colour	14
Tulika	India	1985	gamma rays	M-24	flower colour	31
Uncle Danny	Netherlands	1973	x-rays	Beamsville Pink	flower colour	15
White Cindy	FRG	1989	x-rays	Lilac Cindy	flower colour	35
White Clinspy	Netherlands	1978	x-rays	Clinspy	flower colour	14
White Danusia	Netherlands	1977	x-rays	Danusia	flower colour	13
White Redemine	Netherlands	1984	x-rays	Redemine	flower colour	31
White Refla	Netherlands	1985	x-rays	Refla	flower colour	31
White Remember	Netherlands	1985	gamma rays	Remember	flower colour	31
White Ronny	FRG	1988	x-rays	Ronny (pink)	flower colour	31
White Westland	Netherlands	1978	x-rays	Westland	flower colour	16
White Winner	Netherlands	1975	x-rays	Pink Winner	flower colour	15
Xishihanxiao	China	1991	gamma rays	Chuntao	flower colour	n.i.
Xueyinghong	China	1991	gamma rays	Daguangming	flower type	n.i.
Yalta	USSR	1976	gamma rays	Violet colour	flower colour	14
Yaochuxuean	China	1989	gamma rays	Fenggouhuan	flower colour	n.i.
Yellow Bettina	FRG	1988	x-rays	Bettina (white)	flower colour	31
Yellow Cindy	FRG	1989	x-rays	Lilac Cindy	flower colour	35
Yellow Clingo	Netherlands	1979	x-rays	Clingo	flower colour	14
Yellow Clinspy	Netherlands	1978	x-rays	Clinspy	flower colour	14
Yellow Danusia	Netherlands	1977	x-rays	Danusia	flower colour	14
Yellow Lymon	Netherlands	1985	x-rays	Lymon	flower colour	31
Yellow Redemine	Netherlands	1986	x-rays	Redemine	flower colour	31
Yellow Refla	Netherlands	1986	x-rays	Refla	flower colour	31
Yellow Rendez-Vous	Netherlands	1986	gamma rays	Rendez-Vous	flower colour	31

		Yellow Samba	FRG	1988	x-rays	Samba (white)	flower colour	31
		Yellow Torino	Belgium	1985	x-rays	Pink seedling	flower colour	31
		Yellow Westland	Netherlands	1978	x-rays	Westland	flower colour	16
		Yellow Winner	Netherlands	1975	x-rays	Pink Winner	flower colour	15
		Yingsidai	China	1991	gamma rays	Fenggouhuan	flower colour	n.i.
		Yupiter	USSR	1976	gamma rays	Privet Zime	flower colour	14
		Zitiane	China	1990	gamma rays	104 Ju	flower colour	n.i.
		Zixia	China	1989	gamma rays	Huangjingying	flower colour	n.i.
		Ziyuntuoyue	China	1991	gamma rays	Shuangmantian	flower type	n.i.
Cicer arietinum	chickpea	CM-72	Pakistan	1983	gamma rays	6153	blight resistance	23
		CM-88	Pakistan	1994	gamma rays	C-727	disease resistance	43
		CM-98	Pakistan	1998	gamma rays	K-850		n.i.
		Hyprosola	Bangladesh	1981	gamma rays	Faridpur-1	earliness	19
		Kiran	India	1984	Neutrons	RS-10	erectoid type	26
		Line 3	Egypt	1992	gamma rays, EMS	NECL #055	yield	43
		NIFA-88 (CM-1918)	Pakistan	1990	gamma rays	6153	Ascochyta blight	37
		NIFA-95	Pakistan	1995	gamma rays	line 6151	blight resistance	44
		Pusa 408	India	1985	gamma rays	G-130	yield	29
		Pusa 413	India	1985	gamma rays	G-130	yield	29
		Pusa 417	India	1985	gamma rays	BG 203	yield	29
Citrullus lanatus	watermelon	Gibrid 218	USSR	1984	gamma rays	hybrid Bykovskii 22 x Melitopolskii 143		31
		Huozhou 1	China	1983	cross		quality	n.i.
		Luxigua 1	China	1987	gamma rays	[Taojian 8 x Lemi 1]	earliness	32
Citrus limon	lemon	Eureka 22 INTA	Argentina	1987	x-rays	Frost Eureka	fruit set	44
Citrus paradisi	grapefruit	Rio Red	USA	1984	thN	Ruby Red	fruit colour	37
		Star Ruby	USA	1970	thN	Hudson	seedless	*
Citrus sinensis	orange	Valencia 2 INTA	Argentina	1987	x-rays	Valencia Late	fruit set	44
Citrus sp.	orange/mandarin	Hongju 418	China	1983	gamma rays	Dahongpaohongju (branch)	seedless	27
		Hongju 420	China	1986	gamma rays	Dahongpao (branch)	seed number	34
		Xuegan 9-12-1	China	1983	gamma rays	Xuegan (branch)	seedless	29
		Zhongyu 7	China	1985	gamma rays		seedless	n.i.
		Zhongyu 8	China	1985	gamma rays		seedless	n.i.

Coix lachryma-jobi	job's tears	Hatomusume	Japan	1992	gamma rays	Okayama (local)	earliness	42
Colocasia esculenta	taro	Luyutou 1	China	1993	gamma rays	8501	yield	n.i.
Corchorus capsularis	jute	Binadeshipat-2	Bangladesh	1997	NaN3	CVL-1	fibre yield	44
		Xianghuangma 3	China	1997	gamma rays	Kuanyechangguo	earliness	n.i.
	white jute	Hyb 'C' (Padma)	India	1983	cross		water logging	34
	white jute	JRC-7447	India	1980	x-rays	JRC 212	yield	18
Corchorus olitorius	tossa jute	Atompat-28	Bangladesh	1974	gamma rays	D-154	yield	12
		Atompat-36	Bangladesh	1974	gamma rays	D-154	yield	12
		Atompat-38	Bangladesh	1974	gamma rays	D-154	vigour	12
		IR-1	India	1978	gamma rays	JRO 632	plant vigour	37
		JRO 3690	India	1985	cross		yield	33
		Mahadev TJ-40	India	1983	thN		yield	23
		Shwegontun	Myanmar	1975	gamma rays	C-28	earliness	12
Coronilla varia	crown vetch	Xifuxiaoguanhua	China	1991	gamma rays	Xidexaoguanhua	toxin content	n.i.
Cucumis sativus	cucumber	Altay	USSR	1981	cross		earliness	31
		Ludi 1	China	1981	laser	Jinyan 1	mildew resistance	35
Curcuma domestica	turmeric	BSR 1	India	1986	x-rays	Erode local	rhizome colour	29
		Co 1	India	1983	x-rays	Erode local	rhizome colour	29
Cymbopogon	citronella	Bhanumati (OJC-11)	India	1987	x-rays	Subirrsourav (CKS-CW-S-1)	oil content	35
		Bibhuti (OJC-5)	India	1987	x-rays	Subirrsourav (CKS-CW-S-1)	oil content	35
		Niranjan (OJC-6)	India	1987	x-rays	Subirrsourav (CKS-CW-S-1)	oil content	35
		Phullara (OJC-22)	India	1987	x-rays	Subirrsourav (CKS-CW-S-1)	oil content	35
		Sourav (OJC-3)	India	1987	x-rays	Subirrsourav (CKS-CW-S-1)	oil content	35
		Subir (OJC-31)	India	1987	x-rays	Subirrsourav (CKS-CW-S-1)	oil content	35
Cynodon sp.	bermuda grass	Tifeagle (TW-72)	USA	1995	gamma rays	Tifway II	dwarfness	n.i.
		Tifgreen II	USA	1983	gamma rays		vigour	33
		Tift 94	USA	1995	gamma rays	Midiron	leaf quality	44
		Tifway II	USA	1981	gamma rays	Tifway	nematode	19
Cyperus malaccensis	chinese matgrass	Toyomidori	Japan	1979	gamma rays chronic	Ohi 2	stiffness	21
Dahlia sp.	dahlia	Adagio	France	1970	gamma rays	Aztec	flower colour	17
		Allegro	France	1970	gamma rays	Aztec	flower colour	17
		Altamira	France	1970	gamma rays	Aztec	flower colour	17

Amalfi	France	1970	gamma rays	Aztec	flower colour	17
Annibal	France	1970	gamma rays	Aztec	flower colour	17
Autumn Harmony	Netherlands	1967	x-rays	Arthur Godfrey	flower colour	*
Bichitra	India	1978	gamma rays	Kenya	plant architecture	14
Black Beauty	India	1978		Black Out	plant architecture	14
Dutch Visit	Netherlands	1968	x-rays	Arthur Godfrey	flower colour	*
Explosion	Netherlands	1967	x-rays	Arthur Godfrey	flower colour	*
Governor	Netherlands	1968	x-rays	Authority	flower	*
Gracieuse	Netherlands	1966	x-rays	Salmon Rays	flower colour	*
Happiness	India	1978		Croydon Monarch	plant architecture	14
Holland Jubilee	Netherlands	1967	x-rays	Arthur Godfrey	flower colour	*
Huanghuan	China	1989	gamma rays	Honghua (root + seed)	shortness	n.i.
Jayaprakash	India	1978		Croydon Apricot	plant architecture	14
Jubilee	India	1978	gamma rays	Kenya	plant architecture	14
Jyoti	India	1978	gamma rays	Kenya	plant architecture	14
Maarse's Golden Wond	Netherlands	1972	x-rays	Andries Wonder	flower colour	*
Maarse's Purple Wond	Netherlands	1972	x-rays	Andries Wonder	flower colour	*
Maarse's Red Br.Wond	Netherlands	1972	x-rays	Andries Wonder	flower colour	*
Meiguizi	China	1989	gamma rays	Honghua (root + seed)	flower colour	n.i.
Motive	Netherlands	1971	x-rays	Arthur Godfrey	flower colour	2
Netaji	India	1978		Eagle Stone	plant architecture	14
Ornamental Rays	Netherlands	1966	x-rays	Salmon rays	flower colour	*
Pearl	India	1978		Eagle Stone	plant architecture	14
Pride of Sindri	India	1978	gamma rays	Kenya	plant architecture	14
Progression	Netherlands	1967	x-rays	Arthur Godfrey	flower colour	*
Raymond Smith	Netherlands	1970	x-rays	El Dorado	flower colour	*
Rosy Mist	Netherlands	1967	x-rays	Arthur Godfrey	flower colour	*
Rotonde	Netherlands	1966	x-rays	Salmon Rays	flower colour	*
Selection	Netherlands	1966	x-rays	Salmon Rays	flower	*
Temptation	Netherlands	1968	x-rays	Arthur Godfrey	flower colour	*
Twilight	India	1978	gamma rays	Kenya	plant architecture	14
Vivekananda	India	1978		Croydon Master	plant architecture	14
Wine Herald	Netherlands	1969	x-rays	Holland Herald	flower colour	*

Dianthus caryophyllus	carnation	Accent	Netherlands	1982	x-rays	Benoni	flower colour	31
		Bonitas	GDR	1985	gamma rays		semi-dwarfness	37
		Cerise Kortina	Netherlands	1985	x-rays	Kortina	flower colour	31
		Chaichoompon	Thailand	1983	gamma rays, *in vitro*	White Sim	flower colour	34
		Dione	GDR	1977	EMS	William Sim	flower colour	23
		Enzett Barther Fruhl	GDR	1974	EMS	Arthur Sim	flower colour	23
		Enzett Folklore	GDR	1974	EMS	William Sim	flower colour	23
		Galatee-lonvego	France	1982	gamma rays	Pallas-londorga	Fusarium	33
		Lavendel Kortina	Netherlands	1985	x-rays	Kortina	flower colour	31
		Loncerda	France	1983	gamma rays	Elsy-lodonie	Fusarium	33
		Maiella-lonchabi	France	1982	gamma rays	Pallas-londorga	Fusarium	33
		Pink Kortina	Netherlands	1985	x-rays	Kortina	flower colour	31
		Red Kortina	Netherlands	1985	x-rays	Kortina	flower colour	31
		Royal Red Kortina	Netherlands	1985	x-rays	Kortina	flower colour	31
		Scarlet Bell	Japan	1983	gamma rays	Angel	flower colour	32
		Sim Feu Follet	France	1972	gamma rays	Sim Jaqueline	flower colour	2
		UConn White Sim No.1	USA	1962	gamma rays	White Sim	flower	*
		White Kortina	Netherlands	1985	x-rays	Kortina	flower colour	31
Dolichos lablab	hyacinth bean	Co 10	India	1983	gamma rays	Co 6	yield	29
Eremochloa ophuiroides	centipedegrass	AU Centennial	USA	1983	gamma rays	common centipedegrass	dwarfness	30
		Tifblair	USA	1995	gamma rays		vigour	44
Eriobotrya japonica	loquat	Shiro-mogi	Japan	1981	gamma rays	Mogi	fruit size	21
Euphorbia fulgens	euphorbia	Albora	Netherlands	1976	x-rays		flower colour	15
Eustoma grandiflorum	eustoma	Purple Fantasy	Japan	1996	gamma rays chronic	Pastel Murasaki	flower size	44
		Purple Robin	Japan	1996	gamma rays chronic	Pastel Murasaki	flower colour	44
		Red Robin	Japan	1996	gamma rays chronic	Morgen Rot	flower size	44
Fagopyrum sagittatum	buckwheat	Aelita	USSR	1978	gamma rays	Improved Radekhovskaya	yield	30
		Aromat	USSR	1985	EI	[1557/69 x Madjarska]	stiffness	31
		Chernoplodnaya	USSR	1980	EI	Yubileinaya 2	earliness	40
		Galleya	USSR	1979	gamma rays	Victoria	yield	30

		Kurskaya 87	USSR	1991	cross		cooking quality	40
		Lada	USSR	1979	gamma rays	Improved Radekhovskaya	yield	30
		Podolyanka	USSR	1984	radiation, chemical		compact growth	30
		Skorospelaya 86	USSR	1990	cross		earliness	40
Festuca pratensis	meadow fescue	Fesco	FRG	1982	gamma rays		seed retention	34
		Lifesta	FRG	1981	gamma rays		seed retention	34
		Liforte	FRG	1984	gamma rays		seed retention	34
Ficus benjamina exotica	ficus	Golden King	Belgium	1980	x-rays	Green Ficus	leaf colour	31
		Golden Princess	Belgium	1980	x-rays	Green Ficus	leaf colour	31
Ficus carica	fig	Bol	USSR	1979	gamma rays			18
Forsythia x intermedia	forsythia	Courtadic	France	1984	gamma rays	Vitellina	plant architecture	25
		Courtalyn	France	1984	gamma rays	Linwood	plant architecture	25
Gerbera jamesonii	gerbera	Raisa	Poland	1993	gamma rays	Raisa	flower colour	43
Gladiolus sp.	gladiolus	Red Reflection	Netherlands	1988	x-rays	Peter Pears	flower colour	34
		Shobha	India	1988	gamma rays	Wild Rose	flower colour	34
		Showwinner	Netherlands	1984	x-rays	Applause	flower colour	31
		Tambari	India	1991	gamma rays	Oscar	flower colour	43
Glycine max	soybean	Aida	CSFR	1984	EMS	Smena	earliness	26
		Anji 2	China	1989	laser	hybrid	oil content	n.i.
		Arkadiya Odesskaya	USSR	1986	DMS	VNIIMK 9186	earliness	31
		Bangsa-Kong	Korea	1985	x-rays	CB-27	pod number	26
		Bisser	Bulgaria	1984	gamma rays	Beeson	yield	31
		Boriana	Bulgaria	1981	gamma rays	Beeson	earliness	23
		Cerag No.1	Algeria	1979	gamma rays	B 107/10	earliness	14
		Chudo Gruzii 74	USSR	1974	gamma rays			37
		Dioskuriye	USSR	1980	gamma rays			37
		Doi kham	Thailand	1986	gamma rays	S.J.-4	rust resistance	33
		Dorado	GDR	1988	NMH	Fiskeby V	grain yield	34
		DT-83	Vietnam	1987	EI	Cocchum	seed colour	43
		DT-84	Vietnam	1994	gamma rays	F1 from (DT-80xDH-4)	yield	43
		DT-90	Vietnam	1993	gamma rays	F1 (G7002xCocchum)	yield	43
		Fengdou 1	China	1988	gamma rays	F2 [(Qunxuan 1 x Qunjing) x 5621]	earliness	34

Fengshou 1	China	1970	gamma rays	Ke 56-4253	earliness	27
Fengshou 22	China	1992	gamma rays	Hejiao 77-153	earliness	n.i.
Hefeng 25	China	1992	gamma rays	Hejiao 77	yield	n.i.
Hefeng 33	China	1992	thN	Hejiao 8069	disease resistance	n.i.
Hefeng 36	China	1995	gamma rays	hybrid	earliness	n.i.
Heihe 12	China	1995	fN	hybrid	earliness	n.i.
Heihe 8	China	1989	fN	Heijiao 75-327 strain	adaptability	n.i.
Heihe 9	China	1990	fN	Heijiao 7710 F2	stiffness	n.i.
Heinong 16	China	1970	gamma rays	F3 (Wudingzhu x Jingshanpu)	branching	25
Heinong 28	China	1986	fN	F5 (Heinong 16 x	earliness	30
Heinong 31	China	1987	fN	F4 (Ha 70-5075 x Ha 53)	oil content	32
Heinong 32	China	1987	fN	F4 (Ha 70-5075 x Ha 53)	oil content	32
Heinong 34	China	1988	cross		yield	44
Heinong 35	China	1990	cross		yield	44
Heinong 37	China	1992	thN	hybrid	earliness	n.i.
Heinong 38	China	1992	thN	hybrid	lodging resistance	n.i.
Heinong 4	China	1966	gamma rays	Mancangjing	plant type	25
Heinong 41	China	1997	cross		seed size	44
Heinong 5	China	1967	gamma rays	Dongnong 4	root system	25
Heinong 6	China	1967	x-rays	Mancangjing	tallness	27
Heinong 7	China	1967	x-rays	Mancangjing	branching	25
Heinong 8	China	1967	x-rays	Mancangjing	earliness	25
Heinongxiaolidou 1	China	1989	fN	F2 (7626 x 7634)	grain weight	n.i.
Heinoun 26	China	1975	cross		plant architecture	25
Jidou 8	China	1992	EMS + PMS	Zaoshu 10	earliness	n.i.
Jiyuan 1	China	1986	laser	Gongjiao 6514	drought tolerance	n.i.
Kartuli 7	USSR	1980	gamma rays			37
Kefu 795-832	China	1988	gamma rays, DES	Fengshou 12	tallness	n.i.
KEX-2	Korea	1973	x-rays	Keumkang-Dai-Rip	earliness	4
Kosuzu	Japan	1986	gamma rays	Natto kotubu	earliness	32
Liaodou 10	China	1995	Cross		lodging resistance	n.i.
Liaodou 11	China	1996	Cross		yield	n.i.
Liaodou 3	China	1983	Cross		earliness	27

Liaodou 7	China	1992	gamma rays	hybrid	disease resistance	n.i.
Liaodou 9	China	1993	gamma rays	hybrid	disease resistance	n.i.
Liaoduo 4	China	1992	gamma rays	79 Hong-1	protein content	n.i.
Liaonong 1	China	1988	gamma rays	F2 (Heinong 11 x Tiefeng 9)	earliness	34
Luchezarnaya	USSR	1990	MNH		earliness	40
Ludou 9	China	1993	gamma rays	(7528 x 7405)	plant architecture	n.i.
M-103	Vietnam	1986	gamma rays, EI		yield	44
Mageva (Lastochka-out)	USSR	1991	chemical mutagen		earliness	40
Mufeng 6	China	1987	gamma rays	F2 (Tielingduanyebin x Meiguokelake 63)	earliness	n.i.
Muria	Indonesia	1987	gamma rays	Orba	yield	35
Mushi 6	China	1980	gamma rays	F2 (Fengshu 10 x Jilin 3)	earliness	25
Mutant 2	USSR	1980	gamma rays			37
Nanbushirome	Japan	1977	cross		earliness	21
Ningzheng 3	China	1993	gamma rays	Ningzheng 1	plant architecture	n.i.
Nitrobean-60	Australia	1995	EMS	Bragg	hypernodulation	43
Noventa	Hungary	1989	gamma rays	Altona	earliness	n.i.
Prikarpatskaya 81	USSR	1991	ENH	Kirovogradskaya 2	disease resistance	40
Raiden	Japan	1966	gamma rays	Nemashirazu	earliness	*
Raiko	Japan	1969	gamma rays	Nemashirazu	earliness	*
Ryokusui	Japan	1990	gamma rays	Fukura	lateness	42
S-31	Vietnam	1995	gamma rays, EI	V-74	yield	43
Suilong 12	China	1996	gamma rays	F6 [Suijio 83-432 x (Heihe 4 x Te 7604)]	yield	44
TAEK A3	Turkey	1994	gamma rays	Amsoy 71	oil content	43
TAEK C10	Turkey	1994	gamma rays	Calland	yield	43
Tainung 1(R)	China	1962	thN		vigour	*
Tainung 2(R)	China	1962	x-rays		vigour	*
Tengger	Indonesia	1991	gamma rays	Orba	earliness	42
Tidar	Indonesia	1987	gamma rays	AVRDC No. 29	earliness	35
Tiefeng 18	China	1973	gamma rays	n.i.-15 x 5621	fertilizer response	25

		Tiefeng 19	China	1974	gamma rays	n.i.-15 x 5621	earliness	n.i.
		Tiefeng 24	China	1988	cross		plant architecture	n.i.
		Universal I	USSR	1965	gamma rays	Imeretinskaya	yield	19
		Wase-suzunari	Japan	1983	gamma rays	Okushirome	earliness	32
		Wei 7610-13	China	1983	gamma rays + fN	Fengshouhuang	earliness	32
		Wendou 79012	China	1986	gamma rays		lodging resistance	n.i.
		Yedadou 2	China	1990	gamma rays	(Williams x Sanledaqindou)	disease resistance	n.i.
		Yubian 30	China	1982	x-rays	6825	virus resistance	n.i.
		Yubian 31	China	1982	x-rays	6825	drought tolerance	n.i.
		Yudou 4	China	1987	gamma rays	Heidou	disease resistance	n.i.
		Yudou 9	China	1989	gamma rays	Shangqiu 7068	yield	n.i.
		Zarya	Bulgaria	1984	gamma rays	Zora	earliness	32
		Zhangdou 1	China	1980	gamma rays	Tiefeng 18	drought tolerance	n.i.
Gossypium sp.	cotton	113	China	1985	gamma rays	Liao 6496	earliness	35
		Agdash 3	USSR	1983	gamma rays	Mutant line 9/1	yield	31
		Badnawar-1	India	1961	cross			30
		Chandi 95	Pakistan	1995	gamma rays	NIAB 78	yield	43
		Chuanpei 1	China	1982	gamma rays	Dongtin 1	earliness	34
		DS-1	India	1985	gamma rays	G-27	semi-dwarfness	42
		Emian 15	China	1991	gamma rays	Henan 75	yield	n.i.
		Indore-2	India	1950	x-rays	MU-4 (=Dhar Kambodia)		30
		Jimian 8	China	1984	gamma rays	hybrid	earliness	n.i.
		Khandwa-2	India	1971	cross			30
		Lumian 1	China	1976	gamma rays	F9 (Zhong 2 x 1195)	plant architecture	19
		M.A.9	India	1948	x-rays	Co-2	drought tolerance	30
		MCU 10	India	1982	gamma rays	MCU 4	drought tolerance	29
		MCU 7	India	1971	x-rays	L 1143 EE	earliness	2
		NIAB-26N	Pakistan	1992	cross		yield	n.i.
		NIAB-78	Pakistan	1983	gamma rays	F1 (Deltapine x Ac134)	yield	23
		NIAB-86	Pakistan	1990	cross		yield	n.i.
		NIAB-Karishma	Pakistan	1996	cross		yield	n.i.
		Oktyabr	USSR	1984	cross		compact growth	31
		Pusa Ageti	India	1978	gamma rays	Stoneville 213	ginning capacity	16

		Rasmi	India	1976	gamma rays	MCU 5	photoperiod	16
		Xinhai 2	China	1979	x-rays	66-170	plant architecture	27
		Yanmian 48	China	1985	cross		yield	n.i.
		Yunfu 885	China	1977	gamma rays	Daizimian 15 x Xiaoyemian	earliness	27
Guzmania paecockii	guzmania	Edith	Belgium	1974	gamma rays		leaf colour	17
Helianthus annuus	sunflower	Jingkui 1	China	1987	fN	Mokui	earliness	n.i.
		Pervenets	USSR	1977	DMS	VNIIMK 8931	oil content	13
Hibiscus sp.	hibiscus	Anjali	India	1987	gamma rays	Alipore Beauty	flower colour	31
		Purnima	India	1979	gamma rays chronic	Alipore Beauty	variegated leaves	30
		Shirasagi-no-Yume	Japan	1987	gamma rays		flower colour	33
	roselle	Hiroshima local No.1	Japan	1967	gamma rays	Hiroshima local	tallness	12
		Hiroshima local No.3	Japan	1967	gamma rays	Hiroshima local	tallness	12
		Hiroshima local No.5	Japan	1967	gamma rays	Hiroshima local	tallness	12
		Hiroshima local No.7	Japan	1967	gamma rays	Hiroshima local	tallness	12
Hippophaea rhamnoides	buckthorn	Zyrianka	USSR	1985	gamma rays, MNH	wild form of Altai	yield	28
Hordeum vulgare	barley	7938	China	1984	gamma rays	Zaoshu 3	earliness	n.i.
		AC-Albright	Canada	1993	cross		disease resistance	43
		Acclaim	GDR	1984	cross		yield	37
		AC-Stacey	Canada	1995	cross		earliness	43
		Advance	USA	1979	cross		yield	28
		Akdeniz M-Q-54	Turkey	1998	gamma rays	Quantum	drought tolerance	44
		Akkord	USSR	1987	cross		earliness	31
		Alexis	FRG	1986	cross		powdery mildew	36
		Alf	Denmark	1978	thN	Bomi	shortness	13
		Alis	Denmark	1985	cross		nematode	36
		Allasch	FRG	1963	cross		stiffness	5
		Alpina	Austria	1995	cross		semi-dwarfness	43
		Amagi Nijo 1	Japan	1971	x-rays	Fuji Nijo	earliness	2
		Amalia	Austria	1988	cross		yield	33
		Amazone	FRG	1986	cross			36
		Amei	FRG	1966	cross		stiffness	5
		Amethyst	CSFR	1972	cross		yield	10

Amil	Iraq	1994	gamma rays	Numar	disease resistance	43
Anker	Denmark	1986	cross			37
Anna Abed	Denmark	1979	cross		stiffness	34
Anni	Estonia	1993	cross		drought tolerance	43
Araraty 7	USSR	1983	EI	Caler	lodging resistance	31
Arena	FRG	1983	cross		shortness	36
Ariel	Sweden	1988	cross		stiffness	37
Atlanta	Canada	1977	cross		stiffness	11
Atlas	CSFR	1976	cross		yield	10
Ayr	UK	1986	cross		shortness	34
Bacchus	UK	1981	cross			37
Balder J.	Finland	1960	x-rays	Balder	yield	5
Baraka	Iraq	1994	gamma rays	Baldi	yield	43
Baraka	France	1986	cross		winter type	37
Bastion	USSR	1992	cross		stiffness	41
Beate	FRG	1984	cross		brewing quality	36
Beauly	UK	1983	cross		shortness	34
Berolina	Austria	1982	cross		yield	37
Berta	Austria	1982	cross		yield	20
Betina	France	1970	EMS	Vada	shortness	*
BH-75	India	1983	cross		semi-dwarfness	36
BIOS-1	Russia	1993	cross, DH		lodging resistance	41
Blazer	USA	1974	cross		alpha amylase	10
Blenheim	UK	1987	cross		yield	36
Bonneville 70	USA	1969	thN	Bonneville	threshability	*
Bonus	CSFR	1984	cross		yield	31
Boyer	USA	1974	cross		earliness	10
Camargue	UK	1986	cross		yield	32
Camen	Denmark	1989	cross		yield	37
Camir	Denmark	1985	cross		malting quality	36
Canor	Denmark	1985	cross		malting quality	37
Canut	Denmark	1988	cross		yield	37
Cargine	France	1986	cross			37

Carmen	Austria	1986	cross		yield	29
Carnival	UK	1981	cross			37
Carula	Denmark	1989	cross		malting quality	37
Catrin	Denmark	1985	cross		yield	37
Cheri	FRG	1987	cross		earliness	36
Comtesse	FRG	1987	cross		yield	33
Consista	GDR	1979	cross		yield	32
Corgi	UK	1985	cross			37
Corniche	UK	1985	cross		yield	32
Cromarty	UK	1983	cross		shortness	34
Deawn	USA	1975	cross		shortness	11
Debut	USSR	1982	NEU	Start	yield	20
Defia	GDR	1984	cross		yield	37
Defra	GDR	1984	cross		yield	32
Delita	GDR	1987	cross		yield	32
Denar	CSFR	1969	x-rays	F1 (Celechovicky x Bavaria)		6
Dera	GDR	1982	cross		yield	32
Derkado	GDR	1987	cross		yield	32
Diabas	CSFR	1977	cross			13
Diamant	CSFR	1965	x-rays	Valticky	yield	*
Diana	Bulgaria	1983	gamma rays	Miraj	yield	36
Dinky	Belgium	1987	cross			37
DL-253	India	1981	gamma rays, EMS	Ratna	yield	19
Donan	UK	1983	cross		shortness	34
Dorett	FRG	1985	cross		yield	36
Dorina	GDR	1984	cross		yield	32
Doublet	UK	1983	cross		yield	30
Eight-Twelve	USA	1991	cross		short spikes	41
Elo	Estonia	1989	cross		malting quality	43
Empress	Canada	1983	cross		yield	28
Esk	UK	1985	cross		shortness	34
Eva	Sweden	1972	cross		stiffness	7
Everest	UK	1985	cross			37

Fakel	USSR	1975	EI	Moskovskii 121	shortness	12
Fatran	CSFR	1980	cross		yield	31
Favorit	CSFR	1973	cross		yield	10
Femina	GDR	1984	cross		grain quality	32
Fergie	UK	1990	cross			37
Fleet	UK	1985	cross		yield	37
Formula (=W 7200)	Sweden	1987	cross		shortness	37
Frankengold	FRG	1975	cross			37
Fuji 2-jyo II	Japan	1974	gamma rays, BUdR	Fuji 2-jyo	stiffness	11
Fuxuan 48	China	1985	gamma rays	Zaoshu 3	earliness	n.i.
Galant	Denmark	1984	NaN3	Triumph	proanthocyanine-free content	37
Gamma 4	Japan	1965	gamma rays	Kirin-Choku 1	shortness	*
Gavotte	France	1986	cross			37
Gerlinde	GDR	1979	cross		yield	32
Goldfield	UK	1969	cross			36
Goldmarker	UK	1976	cross		erectoid type	10
Goldspear	UK	1975	cross		erectoid type	10
Gorm	Denmark	1981	cross			37
Grammos	Greece	1969	gamma rays	Rivale	cold tolerance	37
Grisante	UK	1984	cross			37
Grit	GDR	1979	cross		yield	32
Gunilla	Sweden	1970	cross		yield	*
Gunnar	Denmark	1982	cross		earliness	33
Hana	CSFR	1973	cross		yield	10
Hankkija's Aapo	Finland	1975	x-rays	Ta 7990 (a n.i.15 x Staller II)	stiffness	7
Hankkija's Eero	Finland	1975	cross		stiffness	7
Haya-Shinriki	Japan	1962	gamma rays	Aka-Shinriki	earliness	2
Helena	FRG	1983	cross			37
Hellas	Sweden	1967	cross		stiffness	*
Heriot	UK	1983	cross		semi-prostrate	30
Herzo	FRG	1976	cross			37
Hesk	USA	1979	cross		shortness	36

Horal	CSFR	1982	cross		yield	31
Ilka	GDR	1984	cross		yield	32
Inga	Denmark	1982	cross			36
Ingot	UK	1980	cross			36
Jamina	UK	1979	cross			36
Jarek	CSFR	1987	cross		yield	31
Jaspis	CSFR	1986	cross		yield	31
Jenny	Sweden	1980	cross		yield	19
Jianghaidamei	China	1991	gamma rays + microwave	7422	stress tolerance	n.i.
Jupiter	UK	1976	cross		yield	13
Jutta	GDR	1955	x-rays	Peragis mittelfrühe II	yield	*
Jutta	Austria	1983	cross		yield	29
K-2578	India	1980	cross		tallness	36
Karan-15	India	1982	cross		semi-dwarfness	36
Karan-201	India	1984	cross		semi-dwarfness	36
Karan-265	India	1989	cross		semi-dwarfness	36
Karan-3	India	1982	cross		semi-dwarfness	36
Karan-4	India	1983	cross		semi-dwarfness	36
Karat	CSFR	1981	cross		yield	31
Kaskad	USSR	1984	cross		stiffness	31
Kawamizuki	Japan	1979	cross		shortness	21
Kazbek 1	USSR	1983	gamma rays	Dzveltesly	yield	31
Keti	Denmark	1982	cross		yield	20
Kharkovskii 84	USSR	1988	ethyleneoxide	Union	semi-dwarfness	31
Kingspin	UK	1985	cross			36
Koral	CSFR	1978	cross		yield	31
Korinna	GDR	1988	cross		yield	36
Kormovy	Ukraine	1997	EI	Quantum	yield	44
Kosmos	Poland	1977	cross		semi-dwarfness	44
Krassi 2	Bulgaria	1983	cross		shortness	36
Kredit	CSFR	1984	cross		yield	31
Kristina	Sweden	1969	cross		stiffness	*
Krystal	CSFR	1981	cross		yield	31

Kustaa	Finland	1980	cross		earliness	19
Lada	GDR	1979	cross		yield	32
Larissa	GDR	1989	cross		yield	36
Laura	France	1971	cross			37
Leelo	Estonia	1995	cross		yield	43
Leila	France	1984	cross			37
Lenka	GDR	1985	cross		yield	32
Leo-INIA/CCU	Chile	1990	cross		earliness	37
Liisa	Estonia	1981	cross		lodging resistance	43
Lina	Sweden	1982	cross		yield	25
Lupidamei 1	China	1987	gamma rays	Zaoshu 3	photoperiod	n.i.
Lussi (=Vicky)	Sweden		cross		malting quality	37
Luther	USA	1967	dES	Alpine	shortness	*
Madelon	France	1985	cross			37
Maksim	USSR		cross		lodging resistance	37
Mal	USA	1979	cross		lodging resistance	36
Mamluk	USSR	1992	NTMU	line 137/9	earliness	41
Maresi	GDR	1986	cross		yield	32
Mari	Sweden	1962	x-rays	Bonus	earliness	*
Marina	Germany	1994	cross		stiffness	43
Markeli 5	Bulgaria	1976	gamma rays	Beta ketsoras	earliness	14
Mars	CSFR	1983	cross		yield	31
Masakadomugi	Japan	1989	cross		BYMV resistance	35
Matura	FRG	1967	cross			37
Midas	UK	1970	cross		shortness	*
Mikkel	Denmark	1983	cross			37
Milns Golden Promise	UK	1966	gamma rays	Maythorpe	shortness	*
Minak	UK	1976	cross		stiffness	13
Minsk	USSR	1974	gamma rays	Viner	stiffness	6
Mona	Sweden	1970	cross		yield	*
Moskovskii 2	USSR	1984	cross		yield	30
Nadja	GDR	1975	cross		shortness	9
Nairn	UK	1983	cross		shortness	34

Natasha	France	1986	cross		yield	36
Nebi	GDR	1983	cross		yield	32
Nirasaki Nijo 8	Japan	1967	cross		earliness	2
Nomad	FRG	1990	cross			36
Nomini	USA	1992	cross		earliness	42
Noor Al-Qadisyiha 17	Iraq	1995	cross		earliness	43
Noor Al-Qadisyiha 68	Iraq	1995	cross		earliness	43
Novator	USSR		cross		winter hardiness	20
Novum	CSFR	1988	cross		yield	34
Octave	Austria	1986	cross			36
Opal	CSFR	1980	cross		disease resistance	31
Orbit	CSFR	1986	cross		yield	31
Otal	Canada	1981	cross		earliness	43
Othello	UK	1988	cross			37
Pacha	France	1986	cross			37
Pallas	Sweden	1960	x-rays	Bonus	stiffness	*
Pamunkey	USA	1993	cross		semi-dwarfness	43
Patricia	France	1988	cross			37
Peak	UK	1988	cross			37
Pennrad	USA	1963	thN	Hudson	winter hardiness	*
Perelom	USSR	1990	cross		lodging resistance	40
Pernilla	Sweden	1979	cross		earliness	19
Perun	CSFR	1987	cross		yield	31
PL 56	India	1975	EMS	C-164	tillering type	32
Pression	France	1986	cross			37
Prisiv (not released)	USSR		cross		yield	20
Prisma	Netherlands	1985	cross		yield	36
Profit	CSFR	1988	cross		yield	34
Qianlu 1	China	1995	gamma rays	Zaoshu 3	disease resistance	n.i.
Radiation	Korea	1974	thN	Bangju	earliness	5
Radikal	USSR	1988	cross		winter hardiness	31
Rapid	CSFR	1976	cross		yield	9
RD-103	India	1978	cross		shortness	26

RD-137	India	1981	cross		shortness	36
RD-2035	India	1988	cross		shortness	36
RDB-1	India	1972	Neutrons	R.S.-17	shortness	*
Rejkiran	India	1982	cross		shortness	26
Robin	Austria	1986	cross		yield	29
Romi	Denmark	1983	cross			36
Rosie	Denmark	1980	cross			36
Rubin	CSFR	1982	cross		yield	31
Rumba	FRG	1988	cross			36
Rupal	Sweden	1972	cross		shortness	7
Safir	CSFR	1978	cross		shortness	14
Salome	GDR	1981	cross		yield	32
Salve	Sweden	1974	cross		grain size	7
Samir	Iraq	1993	gamma rays	Arivat	yield	43
Secret	Russia	1995	NEU	Monolit	lodging resistance	43
Semal	Denmark	1990	cross		yield	37
Senat	Sweden	1974	cross		stiffness	7
Seru	Sweden	1973	cross			36
Shua	Iraq	1992	fN	Arivat	yield	43
Shyrokolystnii	USSR	1987	NMU+NEU	Obroshynskii-1	tallness	31
Sila	Denmark	1986	cross		stiffness	36
Sissy	FRG	1990	cross		malting quality	37
Skorokhod	USSR	1991	cross		earliness	40
Spartan	CSFR	1977	cross		shortness	14
Spirit	GDR	1986	cross		earliness	32
Stange	Norway	1978	cross		shortness	12
Stella	FRG	1989	cross		brewing quality	36
Taarn	Sweden	1982	cross			36
Taeler	USSR	1991	DMSO	Otra	earliness	35
Tamina	GDR	1982	cross		yield	32
Temp	USSR	1978	ENH	Krasnodarskii 35	earliness	13
Toga	FRG	1986	cross		shortness	36
Tone-nijo	Japan	1990	cross			41

		Troja	Sweden	1981	cross		yield	25
		Trumpf	GDR	1973	cross		shortness	9
		Tuteishy	USSR	1992	cross		lodging resistance	40
		Tuwaitha	Iraq	1992	gamma rays	Arivat	yield	43
		Tyne	UK	1987	cross		shortness	34
		Tyra	Norway	1988	cross		yield	33
		UC 829	USA	1995	cross		semi-dwarfness	43
		UNA-La Molina 95	Peru	1995	gamma rays	Buenavista	earliness	43
		Ursel	FRG	1985	cross			36
		Valerie	France		cross			37
		Vavilon	USSR	1990	cross		lodging resistance	36
		Vega Abed	Denmark	1977	cross		stiffness	34
		Veras	USSR	1992	cross		lodging resistance	40
		Vienna	Austria	1959	x-rays	Probstdorfer Vollkorn VK 41	yield	*
		Visir	Sweden	1970	cross		mildew resistance	*
		VITIM	USSR	1989	cross		lodging resistance	40
		Wandamei 1	China	1991	gamma rays	Zaoshu 3	grain weight	n.i.
		Yanfuaizao 3	China	1977	gamma rays	Zaoshu 3	earliness	25
		Yubilei 100	Bulgaria	1982	cross		yield	36
		Zazerskij 85	USSR		cross			37
		Zenit	CSFR	1985	cross		yield	31
		Zgoda	USSR		cross			37
Hoya carnosa	hoya	Compact Regalis	USA	1980	radiation		leaf colour	31
		Compacta	USA	1980	radiation		leaf colour	31
		Mauna Loa	USA	1980	radiation		leaf colour	31
		Rubra	USA	1980	radiation		leaf colour	31
Humulus lupulus	hop	Crystal	USA		cross		vigour	43
		Santiam	USA	1998	cross	Krasnodar 424	oil quality	44
		Ultra	USA	1995	cross		yield	44
Hyacinthus sp.	hyacinth	Orion	Netherlands	1987	x-rays	Jan Bos	flower colour	34
Ipomoea batatas	sweet potato	Wanshu S-367	China	1998	ion beams	83-367	disease resistance	n.i.
		Yanshu 759	China	1986	fN	(Yanshu 3 x Xushu 18)	starch content	33
		Yanshu 781	China	1986	fN	(Fengshouhuang x Honghong 1)	starch content	33

		Yushu 5	China	1990	gamma rays + NaN3	(Yesheng x Lanyang 203)	disease resistance	n.i.
Iris sp.	iris	Belyi Karlik	USSR	1984	gamma rays		ornamental type	37
		Chistoe Pole	USSR	1984	gamma rays		ornamental type	37
		Marina Raskova	USSR	1984	gamma rays		ornamental type	37
		Marshal Pokryshkin	USSR	1984	gamma rays		ornamental type	37
		Podmoskownaya Osen	USSR	1984	gamma rays		ornamental type	37
Juncus effuses	mat rush	Fukunami	Japan	1984	gamma rays	Asanagi	yield	31
Juncus effusus	mat rush	Seto-nami	Japan	1982	gamma rays	Asanagi	yield	21
Kalanchoe sp.	kalanchoe	Flores	Netherlands	1985	x-rays	Singapur	plant architecture	31
		Lombok	Netherlands	1985	x-rays	Singapur	flower colour	31
		Sumba	Netherlands	1985	x-rays	Singapur	plant architecture	31
Lactuca sativa	lettuce	Blush	USA	1992	EMS	81-1251-C-18-2 (F3)	dwarfness	43
		Evergreen	Japan		32P	Butterhead	heat tolerance	2
		Giantgreen	Japan		32P	Butterhead	heat tolerance	2
		Ice Cube	USA	1992	EMS	81-1251-C-18-2 (F3)	dwarfness	43
		Mini-Green	USA	1992	EMS	81-1251-C-18-2 (F3)	dwarfness	43
		Novogodnii	USSR	1991	EI	Moskovskii parnik	yield	41
Lagerstroemia indica	crapemyrtle	Centennial Spirit	USA		EMS		leaf morphology	28
		Prairie Lace	USA		EMS		sterility	28
Lantana depressa	wild sage	L. dep. bicoloured	India	1986	gamma rays	*Lantana depressa*	leaf colour	37
		L. dep. variagata	India	1986	gamma rays		flower colour	31
		Niharika	India	1986	gamma rays	*Lantana depressa*	leaf colour	37
Lathyrus sativus	plavine, grass pea	Poltavskaya 2	USSR	1980	ENH		drought tolerance	40
Lens culinaris	lentil	Mutant 17 MM	Bulgaria	1999	gamma rays		seed size	44
		S-256	India	1981	radiation	Ranjan	spreading type	20
Lepidium sativum	cress	Vest	USSR	1988	electrons	Uzkolistnyi 3	adaptability	31
Lespedeza cuneata	lespedeza	Interstate	USA	1970	thN		compact growth	*
		Interstate 76	USA	1979	cross		Meloidogyne	16
Lilium sp.	lily	Mies Bouwman	Netherlands	1977	x-rays	Tabasco	flower colour	37
		TX 68-1	Netherlands	1977	x-rays	Tabasco	flower colour	37
Linum usitatissimum	flax	Baltyuchai	USSR	1991	ENH	Vipegantas	disease resistance	41
		M-5	USSR	1991	DMS	Orshanskii 2	disease resistance	41
	flax/linseed	Dufferin	Canada	1979	cross		oil content	18

		Heiya 4	China	1978	cross		earliness	27
		Heiya 6	China	1985	cross		yield	32
		Heiya 7	China	1989	cross		stress tolerance	n.i.
		Linola 989	Canada	1996			oil quality	44
		Redwood 65	Canada	1965	x-rays	Redwood	oil content	5
		Zarja 87	USSR	1988	EI	[LD-147 x Complex]	lateness	31
Lolium sp.	ryegrass	Meritra, R.v.P.	Belgium	1971	colchicine	Lemtal	yield	0
Luffa acutangula	ridged gourd	PKM-1	India	1984	gamma rays	H. 610	yield	32
Lupinus albus	white lupin	Dnepr	USSR	1978	cross		alkaloid content	13
		Drujba	USSR	1984	EMS	Kievskii (rad.mut.)	earliness	31
		Gorizont	USSR	1977	cross			13
		Kievsky Mutant	USSR	1969	radiation	F2 (Hvanchkoly x s.f. Syria)	yield	*
		Martin 2	USSR	1984	cross		Fusarium	31
		Olezhka	USSR	1989	ENH, MNH	Kievskii mutant	alkaloid content	40
		Pyshevoj	USSR	1987	NMU + EI	local line	alkaloid content	31
		Sinii parus	USSR	1991	cross		lodging resistance	40
		Slavutich	USSR	1980	MNH		alkaloid content	40
		Solnechnyi	USSR	1980	chemical		alkaloid content	40
		Start	USSR	1983	gamma rays	White 7	earliness	31
		Ukrainskii	USSR	1981	MNH, EI and DMS		alkaloid content	40
		Vympel	USSR	1982	EI	Rannesp.31 uluchshen	earliness	40
Lupinus angustifolius	blue lupin	Bar	Poland	1991	cross		non-branching	41
		Chittick	Australia	1982	EI	Borre	earliness	20
Lupinus consentini	lupin	Eregulla	Australia	1972	cross		alkaloid content	12
Lupinus luteus	yellow lupin	Aga	Poland	1981	cross		earliness	19
		Kopilovskii	USSR	1985	cross		Fusarium	31
		Narochanskii	USSR	1983	gamma rays	Polish var. R 6025	Fusarium	31
Lycopersicon esculentum	tomato	Bahar	Bangladesh	1992	cross		determinate	42
		Binatomato-2	Bangladesh	1997	gamma rays		yield	n.i.
		Binatomato-3	Bangladesh	1997	gamma rays		yield	n.i.
		Co 3	India	1981	EMS	Co 1	compact growth	29
		Kagyoku	Japan	1985	cross		disease resistance	32

		Kyoryoku-reikou	Japan	1974	gamma rays	(Shugyoku x *L. peruvianum*)	TMV resistance	21
		Kyouryokuogatareikou	Japan	1984	cross		disease resistance	32
		Luch 1	USSR	1965	gamma rays	Pushkinsky	earliness	19
		PKM-1	India	1980	gamma rays	Annanj	yield	32
		Pusa Lal Meeruti	India	1972	gamma rays	Meeruti	fruit ripening	*
		Rannii Nuch	USSR	1983	EI	Jubilejnii 261	earliness	31
		Ryuugyoku	Japan	1985	cross		disease resistance	32
		S.12	India	1969	gamma rays	Sioux	dwarfness	*
Malus pumila	apple	Belrene	France	1970	EMS	Reine des Reinettes	earliness	17
		Blackjoin BA 2 520	France	1970	gamma rays	Jonathan Blackjoin	fruit colour	17
		Courtagold	France	1972	gamma rays	Golden Spur	shortness	30
		Courtavel	France	1972	gamma rays	Starking Delicious	shortness	30
		Golden Haidegg	Austria	1986	gamma rays	Golden Delicious	fruit size	31
		Lysgolden	France	1970	gamma rays	Golden delicious	rust resistance	17
		McIntosh 8F-2-32	Canada	1970	gamma rays	McIntosh	seed colour	1
		Senbatsu-Fuji-2-Kei	Japan	1985	gamma rays	Fuji	fruit colour	37
		Shamrock	Canada	1986	cross		earliness	31
Malus sp.	apple	Donghenghongpinguo	China	1987	gamma rays	Jingguan (seed)	shortness	n.i.
	apple (flowers)	Dovar	Netherlands	1978	x-rays	John Downie	variegated leaves	14
Manihot esculenta	cassava	Tekbankye	Ghana	1997	gamma rays	Isunikakiyan	cooking quality	44
Matricaria chamomilla	chamomile	Podmoskovnaya	USSR	1984	colchicine		lodging resistance	41
Medicago sativa	alfalfa	Xinmu 1	China	1986	gamma rays		cold tolerance	n.i.
Mentha arvensis	mint	Rose mint	Japan	1977	gamma rays	Japanese Mint	yield	15
	peppermint	TN-8	Vietnam	1995	gamma rays	NV-74	oil quality	44
Mentha piperita	peppermint	Murray Mitcham	USA	1976	x-rays	Mitcham	Verticillium	10
		Todd's Mitcham	USA	1971	x-rays	Mitcham	Verticillium	11
Momordica charantia	bitter gourd	MDU 1	India	1984	gamma rays	MC 103	insect resistance	32
Morus alba	mulberry	Fusang 10	China	1980	gamma rays		internode length	27
		Fuzaofeng	China	1992	gamma rays	Yu 151 (branch)	earliness	n.i.
		Ji 7681	China	1988	laser	F1 (Cangxi 49 x Yu 2)	vigour	33
		S54	India	1974	EMS	Berhampore	yield	33
		Sangfu 1	China	1974	gamma rays	Yizhilai	internode length	n.i.
		Shannsang 871	China	1994	gamma rays	hybrid	vigour	n.i.

		Shigu 11-6	China	1995	gamma rays	Husang 32	yield	n.i.
Musa sp.	banana	Klue Hom Thong KU1	Thailand	1985	gamma rays, in vitro	Hom Thong	bunch size	35
		Novaria	Malaysia	1993	gamma rays	Grand Naine	earliness	44
Nelumbo nucifera	lotus	Dandinyuge	China	1997	gamma rays	Xianbeilian 6	flower colour	n.i.
		Dianezhuang	China	1983	gamma rays	Beixianglian	earliness	
		Ruyijiali	China	1997	gamma rays	(Dongguali x Xianbeilian 6)	flower colour	n.i.
Nicotiana tabacum	tobacco	American 307	USSR	1981	cross		leaf colour	41
		American Bahchysarajsk	USSR	1979	NEU	American 181	yield	13
		Baghdad-V77	Iraq	1995	gamma rays	Vargini	yield	43
		Clorina F1	Indonesia	1934	x-rays	Vorstenland	leaf colour	*
		Delhi 76	Canada	1976	gamma rays	Delhi 34	leaf colour	19
		GSH-3	India	1979	cross		leaf quality	30
		Jubilejnyi	USSR	1979	cross		leaf quality	13
		Krupnolystnii B-3	USSR	1979	cross	American 341-62	yield	13
		KY 907	USA	1993	cross		yield	43
		Sumar-V48	Iraq	1995	gamma rays	Vargini	yield	43
		Virginia 0n.i.4	Bulgaria	1986	cross		disease resistance	32
Olea europaea	olive	Briscola	Italy	1981	gamma rays	Ascolana tenera	shortness	19
Onobrychis viciifolia	sainfoin	Kirovogradskij 13	USSR	1986	MNH	Peschanyi	plant architecture	31
		Krasnodarskii 84	USSR	1992	chemical mutagen	Krasnodarskii 2834	yield	41
Ornithopus compressus	serradella	Uniserra	Australia	1971	EMS	Pitman	earliness	*
Oryza sativa	rice	1870	China	1984	gamma rays	Nanjing 33	earliness	n.i.
		202	China	1973	gamma rays	IR 8	leaf size	27
		240	China	1980	gamma rays	Guangbeiguang	earliness	27
		6 B	Vietnam	1986	cross		yield	31
		652	China	1979	gamma rays	129 x Ewan 3	blast resistance	30
		69-280	China	1969	gamma rays	Ainanzhao x Qingxiaojingzao	earliness	27
		7404	China	1977	gamma rays	Xinan 175	shortness	31
		7738	China	1980	gamma rays	Guangbeiguang	earliness	25
		A-20	Vietnam	1990	cross		earliness	42
		A-201	USA	1996	cross		semi-dwarfness	44

Aichinokaori	Japan	1987	cross		yield	42
Aifu 9	China	1966	gamma rays	Aijiaonante	semi-dwarfness	25
Ailiutiaohong	China	1989	gamma rays	Liutiaohong	semi-dwarfness	37
Akichikara	Japan	1986	cross		shortness	32
Akihikari	Japan	1976	cross		semi-dwarfness	11
Amber-Baghdad	Iraq	1994	gamma rays	Amber-33	lodging resistance	43
Amber-Furat	Iraq	1995	gamma rays	Amber-33	earliness	43
Amber-Manathera	Iraq	1995	gamma rays	Amber-33	lodging resistance	43
Arlatan	France	1979	gamma rays	Arlesienne	threshability	18
Atomita 1	Indonesia	1982	gamma rays	Pelita I/1	earliness	21
Atomita 2	Indonesia	1983	gamma rays	Pelita I/1	salt tolerance	23
Atomita 3	Indonesia	1990	gamma rays	No. 627/10-3/PsJ	disease resistance	42
Atomita 4	Indonesia	1991	gamma rays	Cisadane	earliness	42
Au-1	India	1976	gamma rays	IR 8	earliness	29
Aya	Japan	1991	cross		amylose content	42
Baofu 766	China	1988	gamma rays	Baoxuan 3 (PMC)	earliness	n.i.
B-fu 1	China	1982	gamma rays	[(5n.i.0 x Yinnisuitiangu) x BG 90-2]	shortness	29
Binadhan 4	Bangladesh	1998	gamma rays	F2 (BR4 x Iratom 38)	earliness	n.i.
Binadhan 5	Bangladesh	1998	gamma rays	F2 (Dular x Iratom 24)	yield	n.i.
Binadhan 6	Bangladesh	1998	gamma rays	F2 of (Iratom 24 x Dular)	yield	44
Binasail	Bangladesh	1987	gamma rays	Nizersail	tallness	31
Biraj	India	1982	x-rays	OC 1393	lateness	29
BPI Ri 10	Philippines	1983	cross		earliness	42
BPI-121-407	Philippines	1971	gamma rays	BPI-121	earliness	1
Calendal	France	1979	gamma rays	Arlesienne	grain size	18
Calmochi 201	USA	1979	gamma rays	S6	glutinous	15
Calmochi 202	USA	1981	cross		shortness	25
Calmochi-101	USA	1985	cross		photoperiod	28
Calpearl	USA	1981	cross		stiffness	23
Calrose 76	USA	1976	gamma rays	Calrose	shortness	9
Camago-8	Costa Rica	1996	gamma rays	IR-1821	blast resistance	43
Changwanxian	China	1992	gamma rays	hybrid	cold tolerance	n.i.
Changyouzao 1	China	1995	gamma rays	hybrid	earliness	n.i.

Chenzao 5	China	1979	gamma rays	IR 8	earliness	30
Chuukan-bohon Nou-13	Japan	1991	MNU	Kinmaze	amylose content	42
Chuukan-bohon Nou-14	Japan	1991	MNU	Kochihibiki	amylose content	42
Cilosari	Indonesia	1996	cross		yield	44
CNM 20	India	1980	x-rays	IR 8	earliness	18
CNM 25	India	1979	x-rays	IR 8	earliness	18
CNM 31	India	1979	x-rays	IR 8	earliness	17
CNM 6	India	1980	x-rays	IR 8	earliness	18
CRM 49	India	1999	NaN3	IR 50	blast resistance	n.i.
CRM 51	India	1999	NaN3	IR 50	blast resistance	n.i.
CRM 53	India	1999	EMS	IR 50	blast resistance	n.i.
Daisenminori	Japan	1988	cross		lodging resistance	35
Dalris 11	USSR	1988	MNH	Malysh	earliness	31
Danau atas	Indonesia	1988	gamma rays	Seratus malam	blast resistance	35
DB 250	Vietnam	1986	gamma rays	F1 of TB-I x IR-22	adaptability	30
DB-2	Vietnam	1987	ENH	Nep Hoa Vang	earliness	42
DCM-1	Vietnam	1988	MNH	Cuom	semi-dwarfness	42
Dellmont	USA	1992	cross		grain quality	43
Delta	France	1970	gamma rays	Cesariot	grain quality	*
Domannaka	Japan	1992	cross		lodging resistance	42
Dongting 3	China	1976	gamma rays	Aixin 3	semi-dwarfness	21
DT-10	Vietnam	1989	gamma rays, MNH	C4-63	lodging resistance	42
DT-11	Vietnam	1994	gamma rays, NEU	C4-63	disease resistance	43
Ejingnuo 6	China	1986	gamma rays	Guizao 2	blast resistance	31
Enuo 7	China	1994	cross		disease resistance	n.i.
Erfuzao	China	1967	gamma rays	Erjiuai 7	earliness	25
Erjiufeng	China	1985	cross		blight resistance	30
Fu 709	China	1974	gamma rays	Nonghu 6	yield	25
Fu 756	China	1975	gamma rays	Jiangerai	disease resistance	27
Fu 769	China	1976	gamma rays	Jiangerai	disease resistance	27
Fu 8-1	China	1988	gamma rays	8004	blast resistance	37
Fu 8970	China	1995	cross		disease resistance	n.i.

Fubao 201	China	1978	gamma rays	Baoxuan 2	earliness	26
Fuchuerai	China	1978	cross		shortness	37
Fugui 1	China	1980	gamma rays	Guichao 2	earliness	27
Fuheixiangnuo	China	1993	gamma rays	Nongqin 3	earliness	n.i.
Fuhui 06	China	1983	gamma rays	Taiyin 1	earliness	35
Fujihikari	Japan	1977	cross		season-neutral	11
Fulgente	Italy	1973	x-rays	Maratelli	blast resistance	10
Fulianai	China	1966	gamma rays	Liantangzao	semi-dwarfness	25
Fulianzao 3	China	1968	gamma rays	Liantangzao	earliness	27
Fuluzao 1	China	1976	gamma rays	Guangdongai 4 x IR 8	leaf size	27
Funo 402	China	1989	gamma rays	Guichao 2	glutinous	35
Funuo 1	China	1995	cross		earliness	n.i.
Funuo 101	China	1987	gamma rays	Guichao 2	earliness	33
Fushe 31	China	1966	gamma rays	Lucaihao	earliness	25
Fushe 410	China	1974	gamma rays	Chenai 8	blast resistance	27
Fushe 94	China	1971	neutrons	Zhongaizi	earliness	25
Fushenongken 58	China	1973	gamma rays	Nongken 58	disease resistance	29
Fuwan 23	China	1978	gamma rays	Huxuan 19	disease resistance	25
Fuwan 81-548	China	1989	gamma rays	Yuchi 231-8	grain quality	n.i.
Fuxian 6	China	1989	cross		disease resistance	37
Fuxiang 1	China	1978	gamma rays + microwave	Mingshuixiangdao	earliness	27
Fuxuan 1	China	1968	gamma rays	Zhongnong 4	earliness	27
Fuxuan 124	China	1972	gamma rays	Guangxuan 3	blast resistance	25
Fuxuan 3	China	1970	gamma rays	Fuxuan 1	tillering type	25
Fuxuan 8	China	1998	cross		blast resistance	n.i.
Fuyou 130	China	1997	cross		yield	n.i.
Fuyou 63	China	1993	cross		earliness	n.i.
Fuyou 802	China	1998	cross		earliness	n.i.
Fuyou 838	China	1997	cross		earliness	n.i.
Fuyouxiannuo	China	1995	gamma rays	IR 1259	earliness	n.i.
Fuyouxiannuo	China	1995	gamma rays	Nongqin 2	semi-dwarfness	n.i.
Fuyu 1	China	1968	gamma rays	Erjiuai 7	earliness	25
Fuzao 2	China	1969	gamma rays	Erjiuai	earliness	25

Fuzhou 383	China	1989	cross		plant architecture	n.i.
Fuzhu	China	1979	gamma rays	Zhulianai	earliness	25
Gangai A/Fuhui 06 H.	China	1985	cross		fertility rate	35
Ganwannuo	China	1993	gamma rays	SG 8960	grain quality	n.i.
Ganwanxian 23	China	1994	cross		grain quality	n.i.
Ginnosei	Japan	1992	cross		grain size	42
Gongshe 13	China	1969	gamma rays	Laolaiqing	disease resistance	27
Guangdabai	China	1979	laser	Hong 410	earliness	25
Guangfen 1	China	1977	laser	Guangluai 4	earliness	27
Guangfu 1	China	1981	gamma rays + laser	Hong 410	earliness	25
Guifu 3	China	1973	gamma rays	Guiluai 8	earliness	25
Guifunuo	China	1989	gamma rays	Shuangchengnuo	yield	n.i.
Guifuxian 2	China	1992	gamma rays	83-231	grain quality	n.i.
Guiwanfu	China	1988	gamma rays	Baotaiai	cold tolerance	n.i.
Hanahikari	Japan	1975	cross		semi-dwarfness	21
Hangfeng	China	1983	cross		shortness	30
Hangyu 1	China	1998	aerospace	ZR 9	earliness	n.i.
Hari	India	1987	cross		shortness	34
Hatsukogane	Japan	1984	cross		shortness	32
Hayahikari	Japan	1976	cross		stiffness	11
Heiseimochi	Japan	1990	cross		lodging resistance	42
Heugseonchalbyeo	Korea,	1998	gamma rays	Sanghaehyang	grain quality	n.i.
Hirohikari	Japan	1990	cross		stiffness	42
Hongfuzao 7	China	1980	gamma rays	Hong 410	shortness	27
Hongnan	China	1981	gamma rays	F2 (Hongmeizao x Guanxi 1)	earliness	25
Hongtu 31	China	1985	electrons	Hong 410	cold tolerance	31
Houhai	Japan	1976	cross		semi-dwarfness	21
HPU 8020	India	1984	gamma rays	Bala	lateness	29
Hu 2205	China	1987	gamma rays	IET 2938	cooking quality	41
Huangpiai	China	1969	gamma rays	Huangpizhong	semi-dwarfness	25
Huayu 1	China	1990	gamma rays		yield	n.i.
HUR-36	India	1990	gamma rays, EMS	Mahsuri	earliness	42

Hybrid Mutant 95	India	1973	gamma rays	(Jhona 349 x Taichung Native1)	semi-dwarfness	4
Hyokeisake 18	Japan	1972	cross		semi-dwarfness	21
Ibukiwase	Japan	1986	cross		cold tolerance	32
II You 802	China	1996	cross		yield	n.i.
II You 838	China	1995	cross		earliness	n.i.
IIT 48	India	1972	ethyleneoxide	IR 8	earliness	*
IIT 60	India	1972	EMS	IR 8	earliness	*
Ikungbau 4-2	China	1973	x-rays	Ikungbau		37
Indira	India	1980	EMS	Tainan-3	earliness	29
Intan Mutant	India	1988	EI	Intan	photoperiod	35
IRAT 13	Cote d'Ivoire	1978	gamma rays chronic	(63 x 83)	stiffness	11
IRAT 101	Cote d'Ivoire	1976	gamma rays chronic	IRAT 2	adaptability	33
IRAT 104	Cote d'Ivoire	1983	cross		tallness	34
IRAT 109	Cote d'Ivoire	1978	cross		productivity	37
IRAT 110	Cote d'Ivoire	1978	cross		grain quality	37
IRAT 112	Cote d'Ivoire	1983	cross		tillering type	34
IRAT 113	Cote d'Ivoire	1979	gamma rays chronic	Moroberekan	shortness	33
IRAT 114	Cote d'Ivoire	1979	gamma rays chronic	Moroberekan	shortness	33
IRAT 115	Cote d'Ivoire	1979	gamma rays chronic	Moroberekan	shortness	33
IRAT 116	Cote d'Ivoire	1979	gamma rays chronic	Moroberekan	shortness	33
IRAT 117	Cote d'Ivoire	1979	gamma rays chronic	Moroberekan	shortness	33
IRAT 133	Cote d'Ivoire	1978	cross		shortness	35
IRAT 134	Cote d'Ivoire	1978	cross		shortness	35
IRAT 136	Cote d'Ivoire	1978	cross		grain quality	37
IRAT 144	Burkina	1978	cross		yield	34
IRAT 1n.i.	Burkina	1979	cross		shortness	35
IRAT 147	Cote d'Ivoire	1979	cross		grain morphology	37

IRAT 161	Cote d'Ivoire	1980	cross		productivity	37
IRAT 170	Cote d'Ivoire	1984	cross		tillering type	34
IRAT 177 (Cabaçu)	Brazil	1988	spont. from IRAT 79		tallness	34
IRAT 191 (IREM 191)	Guyana	1980	gamma rays chronic	IAC 25	tallness	33
IRAT 192 (IREM 192)	Guyana	1980	gamma rays chronic	IAC 25	tallness	33
IRAT 193 (IREM 193)	Guyana	1980	gamma rays chronic	IAC 25	tallness	33
IRAT 194 (IREM 194)	Guyana	1980	gamma rays chronic	IAC 25	shortness	33
IRAT 195 (IREM 195)	Guyana	1980	gamma rays chronic	IAC 25	tallness	33
IRAT 196 (IREM 196)	Guyana	1980	gamma rays chronic	IAC 25	tallness	33
IRAT 213 = ISA 3	Cote d'Ivoire	1982	cross		grain morphology	37
IRAT 214 = ISA 4	Cote d'Ivoire	1982	cross		yield	37
IRAT 216	Cote d'Ivoire	1985	cross		adaptability	34
IRAT 239 (IREM 779)	Guyana	1980	gamma rays chronic	IAC 25	tallness	33
IRAT 240 (IREM 950)	Guyana	1980	gamma rays chronic	IAC 25	tallness	33
IRAT 241 (IREM 73-2)	Guyana	1983	gamma rays chronic	IAC 5100	tallness	33
IRAT 242 (IREM575-1)	Guyana	1983	gamma rays chronic	IAC 5100	shortness	33
IRAT 243 (IREM 15-2)	Guyana	1983	gamma rays chronic	IAC 5100	tallness	33
IRAT 244 (IREM 12-5)	Guyana	1983	gamma rays chronic	IAC 5100	tallness	33
IRAT 2n.i. (IREM43111)	Guyana	1983	gamma rays chronic	IAC 5100	tallness	33
IRAT 2n.i. (IREM 3n.i.3)	Guyana	1983	gamma rays chronic	IAC 5100	tallness	33

IRAT 247 (IREM 75-1)	Guyana	1983	gamma rays chronic	IAC 5100	tallness	33
IRAT 248 (IREM 2-1)	Guyana	1983	gamma rays chronic	IAC 5100	shortness	33
IRAT 249 (IREM12322)	Guyana	1983	gamma rays chronic	IAC 5100	tallness	33
IRAT 250 (IREM 52-1)	Guyana	1983	gamma rays chronic	Pratao Precoce	tallness	33
IRAT 251 (IREM297-3)	Guyana	1983	gamma rays chronic	Pratao Precoce	tallness	33
IRAT 252 (IREM n.i.-4)	Guyana	1983	gamma rays chronic	Pratao Precoce	tallness	33
IRAT 253 (IREM 50-2)	Guyana	1983	gamma rays chronic	Pratao Precoce	tallness	33
IRAT 254 (IREM 53-2)	Guyana	1983	gamma rays chronic	Pratao Precoce	tallness	33
IRAT 255 (IREM 35-2)	Guyana	1983	gamma rays chronic	Pratao Precoce	shortness	33
IRAT 256 (IREM n.i.-2)	Guyana	1983	gamma rays chronic	Pratao Precoce	shortness	33
IRAT 257 (IREM 4113)	Guyana	1983	gamma rays chronic	Makouta	shortness	33
IRAT 258 (IREM 4114)	Guyana	1983	gamma rays chronic	Makouta	shortness	33
IRAT 268 = IDSA 16	Cote d'Ivoire	1983	cross		grain quality	37
IRAT 269 = IDSA 16	Cote d'Ivoire	1983	cross		grain quality	37
IRAT 320 = IDSA 48	Cote d'Ivoire	1987	cross		grain morphology	37
IRAT 4 (IRAT 51)	Senegal	1968	gamma rays chronic	Sintane Diofor		33
IRAT 5 (IRAT 52)	Senegal	1968	gamma rays chronic	Sintane Diofor		33
IRAT 78 (M18)	Cote d'Ivoire	1976	gamma rays chronic	IRAT 2	leaf morphology	33
IRAT 79 (Mn.i.)	Cote d'Ivoire	1976	gamma rays chronic	IRAT 2	tillering type	33

Iratom 24	Bangladesh	1970	gamma rays	IR 8	earliness	29
Iratom 38	Pakistan	1970	gamma rays	IR 8	earliness	*
IRI #308	Korea,	1970	x-rays	Baekna 18	semi-dwarfness	n.i.
IRI 307	Korea	1970	thN	Palkweng	semi-dwarfness	44
ITA 123	Nigeria	1980	gamma rays		semi-dwarfness	42
ITA 235	Nigeria	1988	cross		RYMV resistance	42
ITA 314	Nigeria	1988	cross		semi-dwarfness	42
Iwate 21	Japan	1988	gamma rays	Sasanishiki	semi-dwarfness	35
Jagannath	India	1969	x-rays	T-141	grain size	0
Jiahezaozhan	China	1997	gamma rays	- (pollen)	grain quality	n.i.
Jiasifu	China	1973	gamma rays	Jiahu 4	earliness	25
Jiguang 2	China	1977	laser	Guangluai 4	shortness	27
Jinfu 1	China	1969	gamma rays	Jinyin 37	earliness	25
Jinfu 48	China	1988	gamma rays	Jinke 5	yield	n.i.
Jinfu 8	China	1969	gamma rays	Xiaozhan 101	earliness	25
Juangyebai	China	1974	neutrons	IR 8	earliness	25
K84	India	1967	gamma rays	T 65	earliness	29
Kagahikari	Japan	1973	cross		earliness	11
Kashmir Basmati	Pakistan	1977	gamma rays	Basmati 370	earliness	10
Katsurawase	Japan	1978	cross		earliness	21
Kefuhong 2	China	1981	cross		earliness	25
Keshari	India	1980	cross		shortness	29
Khao Jao Hawm	Thailand	1998	cross	Shinsu		44
Khushboo	Pakistan	1995	gamma rays	Jaijai 77	grain size	n.i.
Kinuhikari	Japan	1991	cross		lodging resistance	42
Koihime	Japan	1990	cross		lodging resistance	42
KT 20-74	China	1957	x-rays	Ketze	yield	*
Kunihikari	Japan	1987	cross		lodging resistance	33
Lafitte	USA	1995	cross		semi-dwarfness	44
Liaofeng 5	China	1969	gamma rays	Liaogeng 125	earliness	27
Liaoyan 2	China	1992	gamma rays	Toyonishiki	salt tolerance	41
M 112	China	1981	gamma rays	5n.i.0 x Yinnishuitiangu	cold tolerance	27
M 114	China	1981	gamma rays	[(5n.i.0 x Yinnisuitiangu) BG 90-2]	cold tolerance	25

M-101	USA	1979	cross		shortness	15
M-102	USA	1987	cross		lateness	32
M-202	USA	1985	cross		photoperiod	28
M-203 (86-Y-35)	USA	1989	gamma rays	M-40	photoperiod	37
M-204	USA	1992	cross		photoperiod	43
M-301	USA	1980	cross		grain size	18
M-302	USA	1981	cross		shortness	25
M-401	USA	1981	gamma rays	Terso	shortness	19
M7	USA	1977	cross		shortness	13
Madjan	USSR	1987	NMU	line KZROS 356	stiffness	31
Malysh	USSR	1982	EMS	Sirayuki	earliness	40
Marathon	France	1985	gamma rays	Maratelli	blast resistance	30
Megumimochi	Japan	1983	cross		shortness	32
Meisanwu 2	China	1990	gamma rays	Aimeizao 3 x Waixuan 35	disease resistance	n.i.
Mercury	USA	1988	cross		earliness	35
MI-273(m)	Sri Lanka	1971	gamma rays	H4	shortness	29
Milyang 10	Korea	1972	x-rays	Palkweng	semi-dwarfness	*
Mineasahi	Japan	1980	cross		earliness	21
Minnuo 706	China	1991	gamma rays	7056 x IR29	tillering type	35
Minyuan 1	China	1977	gamma rays	Sanyeqi	photonasty	35
Miyama Nishiki	Japan	1978	gamma rays	Takane-Nishiki	grain size	15
Miyanishiki	Japan	1978	cross		earliness	17
Miyukimochi	Japan	1979	gamma rays	Toyonishiki	glutinous	15
Mohan = CSR4	India	1983	gamma rays	IR 8	salt tolerance	37
MT-4	Vietnam	1988	ENH	Moc Tuyen	lodging resistance	42
MT-6	Vietnam	1993	DMS	F1 from IR8 x X6	stiffness	43
Musashikogane	Japan	1981	cross		shortness	21
Mutant 428	USSR	1989	MNH	[Fanu x KUR-127]	lodging resistance	40
Mutashali	Hungary	1980	fN	Dunghan Shali	blast resistance	30
Mutsuhomare	Japan	1986	cross		shortness	32
Mutsuhonami	Japan	1973	cross		grain quality	*
Mutsukaori	Japan	1981	cross		shortness	21
Mutsukomachi	Japan	1981	cross		shortness	21

Nadahikari	Japan	1977	cross		shortness	21
Nangeng 23	China	1967	gamma rays	20025	shortness	27
Nanjing 34	China	1976	gamma rays + microwave	Zhaofeng	shortness	19
Nanzao 1	China	1980	gamma rays	Nanjing 11	earliness	27
NIAB-IRRI-9	Pakistan	1999	fN	IR-6	salt tolerance	n.i.
Niigatawase	Japan	1979	cross		shortness	21
Nijihikari	Japan	1989	cross		lodging resistance	42
NN 22-98	Vietnam	1983	ENH	IR 22	stiffness	30
Nongshi 4	China	1975	fN	IR 20	earliness	27
Norin PL 12	Japan	1991	gamma rays	Reimei	thermosensitive	42
Nucleoryza	Hungary	1972	fN	Cesariot	earliness	2
Nucus 2	USSR	1986	cross		shortness	40
Oltenita	Romania	1992	gamma rays	Krasnodar 424	lodging resistance	44
Oryzella	Hungary	1983	EMS	Chiapelli x Duborszkij 129	earliness	30
Padmini	India	1988	gamma rays	CR 1014	earliness	37
PARC 1	Philippines	1970	gamma rays	IR 8-288-3	grain size	4
PARC 2	Philippines	1970	gamma rays	IR 8-68	earliness	4
PL-56	India	1975	EMS	C-164	tillering type	29
Prabhavati	India	1984	EMS	Ambemohor local	shortness	29
Pusa-NR-162	India	1988	cross		earliness	42
Pusa-NR-166	India	1989	cross		synchronous	42
Pusa-NR-381	India	1989	cross		blast resistance	42
Pusa-NR-519	India	1990	cross		pest resistance	42
Pusa-NR-5n.i.	India	1998	gamma rays	F2 (PNR 125-2 x PNR 130-2)	grain quality	n.i.
Pusa-NR-550-1-2 (JD-8)	India	1997	cross		semi-dwarfness	44
Pusa-NR-551-4-20 (JD-6)	India	1997	cross		semi-dwarfness	44
Pusa-NR-555-28 (JD-10)	India	1997	cross		semi-dwarfness	44
Pusa-NR-555-5	India	1990	cross		earliness	42
Pusa-NR-555-5 (JD-3)	India	1998	cross		yield	44
Pusa-NR-570-17	India	1990	cross		earliness	42
Pusa-NR-571	India	1990	cross		semi-dwarfness	44
Pygmalion	France	1987	chemical	Cigalan	yield	35

Qikesui	China	1986	gamma rays	Hejiang 12	cold tolerance	30
Qinghuaai 6	China	1980	cross		yield	37
Qingwei 1	China	1985	gamma rays		yield	37
Qiufu 1	China	1982	gamma rays	Qiujuai	cold tolerance	31
Quannuo 101	China	1990	gamma rays	hybrid	yield	n.i.
R n.i.2	China	1985	gamma rays	501 Xuan (pollen)	shortness	30
R 817	China	1987	gamma rays	Aishungnuo	glutinous	31
Radiation 85-63	China	1989	cross		tillering type	37
Rasmi	India	1985	gamma rays	Oorpandy	awnless	30
RD 10	Thailand	1981	fN	RD 1	glutinous	18
RD 15	Thailand	1978	gamma rays	Khao Dawk Mali 105	earliness	13
RD 6	Thailand	1977	gamma rays	Khao Dawk Mali 105	glutinous	10
Reimei	Japan	1966	gamma rays	Fujiminori	shortness	0
Rokkonishiki	Japan	1982	cross		grain size	21
S 201	USA	1980	cross		shortness	18
S-102	USA	1996	cross		earliness	44
S2-Calpearl	USA	1987	radiation	Calpearl	shortness	37
S-301	USA	1991	cross		semi-dwarfness	42
Sachiminori	Japan	1978	cross		stiffness	21
Salir	Portugal	1983	gamma rays	Saloio	yield	30
Sattari	India	1983	gamma rays	NSJ 200 x Padma	earliness	29
Savitri	India	1983	cross		daylength	29
SH 30-21	China	1957	x-rays	Shungchiang	yield	*
Shadab	Pakistan	1987	EMS	IR 6	yield	30
Shanyou 371	China	1998	cross		grain quality	n.i.
Shenxiangjing	China	1994	x-rays		blast resistance	n.i.
Shinanosakigake	Japan	1982	gamma rays	Toyonishiki	grain size	21
Shirakabanishiki	Japan	1982	gamma rays	Reimei	grain size	21
Shua 92	Pakistan	1993	gamma rays	Shadab	salt tolerance	42
Shuangchengnuo	China	1980	gamma rays	2004	compact growth	25
Shuangchiang 30-21	China	1957	x-rays	Shuangchiang	yield	30
Shuangfu 1	China	1989	gamma rays	Guichao 2	shortness	n.i.
Shuangke 1	China	1981	cross		earliness	25

Shwethwetun	Myanmar	1981	gamma rays	IR 24	tallness	20
Shwewartun	Myanmar	1975	gamma rays	IR 5	grain quality	12
Sifu 851	China	1985	cross		earliness	30
Suifu 17	China	1979	gamma rays	Suiya 156	shortness	25
Suiwan 2	China	1974	gamma rays	Huxuan 19	tillering type	27
Suzutakara	Japan	1990	EMS	Akenohoshi	earliness	42
Taifu 4	China	1979	gamma rays	Taizhong 3	disease resistance	30
Tangernian	China	1985	gamma rays		yield	37
THDB	Vietnam	1999	gamma rays	Tep Hanh	semi-dwarfness	n.i.
TNDB 100	Vietnam	1997	gamma rays	Tai Nguyen Duc	semi-dwarfness	n.i.
Tsugaruotome	Japan	1990	cross		shortness	42
UNP 9027	Costa Rica	1994	gamma rays	CR 1113	disease resistance	43
Valencia 87	USA	1987	radiation	Calpearl	lodging resistance	37
Vellayani	India	1968	Neutrons	PTB 10		29
VN 10	Vietnam	1975	cross			29
VN 20	Vietnam	1975	cross			29
VN 4	Vietnam	1975	cross		earliness	29
VND 95-19	Vietnam	1998	gamma rays	IR 64	stiffness	n.i.
VND 95-20	Vietnam	1998	gamma rays	IR 64	earliness	n.i.
VND95-26	Vietnam	1995	gamma rays	IR 9729	earliness	44
Vyouwan 3	China	1994	cross		yield	n.i.
Wandao 20	China	1994	ion beams	Eyu 105	grain quality	n.i.
Wandao 25	China	1990	gamma rays	Minggui 1 x Simei 2	earliness	n.i.
Wandao 42	China	1997	ion beams	Taiwanzhongjing	earliness	n.i.
Wandao 44	China	1997	ion beams	hybrid	yield	n.i.
Wandao n.i.	China	1994	ion beams	Zhe 15	earliness	n.i.
Wandao 51	China	1997	gamma rays	hybrid	yield	n.i.
Wanfu 33	China	1980	gamma rays	72-10	earliness	25
Wanfu 8818	China	1997	gamma rays	Yaodao 4	yield	n.i.
Wangeng 257	China	1975	gamma rays	Huxuan 19	fertilizer response	25
Wanhongfu	China	1980	gamma rays	25-1 x Hongmiyouzhan	cold tolerance	27
Wanhua	China	1983	cross		semi-dwarfness	37
Wanjing 3073	China	1990	gamma rays	Sujing 7 x Ewan 5	fertilizer response	n.i.

Weiyouji	China	1983	cross		earliness	31
Wongwangbyeo	Korea,	1998	gamma rays	Seomjinbyeo	disease resistance	n.i.
Wonmibyeo	Korea,	1998	gamma rays	Chuchongbyeo	earliness	n.i.
Wonpyungbyeo	Korea,	1998	gamma rays	Hwaseongbyeo	semi-dwarfness	n.i.
Xangzaonuo 1	China	1984	gamma rays	F2 (IR 29 x Wenqingxuan)	glutinous	30
Xiangfudao	China	1976	gamma rays	Erjiuqing	cold tolerance	25
Xianghu 24	China	1984	cross		blast resistance	35
Xianghu 47	China	1985	cross		panicle size	n.i.
Xianghu 93	China	1984	cross		lateness	n.i.
Xiangjing 832	China	1989	x-rays	Wuxiang 203	shortness	35
Xiangwanxian 7	China	1996	cross		blast resistance	n.i.
Xiangzaoxian 18	China	1995	gamma rays	hybrid	earliness	n.i.
Xiangzaoxian 20	China	1995	gamma rays	hybrid	earliness	n.i.
Xiangzaoxian 21	China	1996	gamma rays + laser	Xiangaizao 7	blight resistance	n.i.
Xiangzaoxian 22	China	1996	cross		grain quality	n.i.
Xiangzaoxian 23	China	1997	cross		earliness	n.i.
Xiangzaoxian 25	China	1997	cross		shortness	n.i.
Xiangzaoxian 28	China	1999	chemical	Zhe 733	earliness	n.i.
Xiangzaoxian 8	China	1988	laser	Xiangaizao 9	earliness	n.i.
Xiangzaoxian 9	China	1989	gamma rays	Hongtu 5	earliness	n.i.
Xiaofuzao	China	1974	gamma rays	Liantangzao	earliness	25
Xieyou 371	China	1999	cross		earliness	n.i.
Xindao 1	China	1986	gamma rays	F2 (Ningxi 62-2 x Panjin 1)	earliness	31
Xiongyue 613	China	1970	gamma rays	Nongken 20	blast resistance	25
Xiushui 04	China	1985	cross		earliness	n.i.
Xiushui 06	China	1984	cross		earliness	n.i.
Xiushui 48	China	1984	cross		blast resistance	35
Xiuxui 117	China	1984	cross		earliness	n.i.
Yangdao 6	China	1997	gamma rays	hybrid	yield	n.i.
Yangfunuo 1	China	1990	gamma rays	IR 29	earliness	n.i.
Yangfuxian 2	China	1991	gamma rays	IR 1529-68-32	yield	n.i.
Yangfuxian 3	China	1993	gamma rays	IR 2415	blast resistance	n.i.

		Yanzhengfu	China	1979	gamma rays	Longzhen 13	yield	37
		Yenhsing-1	China	1963	cross		yield	29
		Yenhsing-2	China	1967	cross		erectoid type	29
		Yifunuo 1	China	1977	gamma rays	IR 8	blast resistance	25
		Youfu 5	China	1980	gamma rays	Siyou 2	earliness	27
		Yuanfengzao	China	1975	gamma rays	IR 8	earliness	19
		Yuanjing 11	China	1990	gamma rays	R 824 x C 80n.i.	earliness	n.i.
		Yuanjing 2	China	1988	gamma rays	Nonghuo 6	yield	n.i.
		Yuanjing 4	China	1993	gamma rays	Suishui 14 x Suishui 27	blast resistance	n.i.
		Yuanjing 7	China	1999	gamma rays	hybrid	grain quality	n.i.
		Yumeminori	Japan	1992	cross		lodging resistance	42
		Zaoyeqing	China	1980	gamma rays	Zaoyeqing 8	panicle size	27
		Zhefu 218	China	1995	cross		earliness	n.i.
		Zhefu 504	China	1999	gamma rays	hybrid	earliness	n.i.
		Zhefu 7	China	1991	gamma rays	Erjiufong	earliness	43
		Zhefu 762	China	1993	cross		disease resistance	n.i.
		Zhefu 802	China	1981	gamma rays	Simei 2	earliness	25
		Zhefu 852	China	1989	gamma rays	Zhefu 802 x Shuiyuan 290	blast resistance	n.i.
		Zhefu 9	China	1990	cross		yield	
		Zhenfu 1	China	1971	gamma rays	Zhenshuai	earliness	25
		Zhengguang 1	China	1979	gamma rays	Taizhongyu 39	YDV resistance	25
		Zhenuo 2	China	1993	gamma rays	R8917	blast resistance	n.i.
		Zhong 156	China	1993	cross		yield	n.i.
		Zhongbao 2	China	1977	fN		earliness	25
		Zhongmounuodao	China	1982	gamma rays	Tianbian 10	glutinous	27
		Zhongtie 31	China	1986	fN	Tieqiu 15	yield	30
		Zhongzhe 1	China	1989	cross		yield	n.i.
		Zhouyou 903	China	1994	cross		grain quality	n.i.
		Zhuchou 40	China	1978	gamma rays	F2 (Zhulianai x Qiuzhen)	cold tolerance	27
		Zijiangnuo	China	1984	cross		yield	n.i.
		Zixiangnuo 861	China	1989	x-rays	Lungjing 2 (germinating seed)	shortness	35
		Zolotistyi	USSR	1989	ENH	[Rossiiskii]	cooking quality	40
Panicum miliaceum	millet	Cheget	Russia	1993	cross		drought tolerance	41

		Kharkovskoe 57	USSR	1987	MNH	Kharkovskoye 37	cooking quality	40
		Lipetskoe 19	USSR	1985	DMS	line No. 947	cooking quality	40
		Lipetskoe 19 *	USSR	1985	DMS, NEH	Line No. 947	earliness	30
Papaver somniferum	opium poppy	BC-28/9/4 (Vivek)	India	1992	gamma rays	Shweta	capsule size	42
Pelargonium	geranium	Dark Mozart	FRG	1988	x-rays	Mozart	flower colour	35
Pennisetum sp.	pearl millet	ICMH n.i.1	India	1986	gamma rays	Tift 23 DB	mildew resistance	30
		New Hybrid Bajra 5	India	1974	gamma rays	Male sterile inbred line Tift 23A	Sclerospora	11
		NHB 3 (hybrid)	India	1975	cross		Sclerospora	37
		NHB 4 (hybrid)	India	1975	cross		Sclerospora	37
		Pusa n.i.	India	1982	radiation	(J104 x K559)	mildew resistance	23
Phaseolus vulgaris	common bean	AC Hensall	Canada	1997	cross		earliness	n.i.
		AC Skipper	Canada	1996	cross		earliness	n.i.
		Albion	USA		cross		earliness	n.i.
		Alfa	CSFR	1972	EMS	Black bean	seed colour	10
		Arapaho	USA	1995	cross		bushy type	n.i.
		Black Magic	USA	1987	cross		seed colour	n.i.
		Blackhawk	USA	1990	cross		seed colour	n.i.
		C-20	USA	1982	cross		seed colour	n.i.
		CAP-1070	Brazil	1986	gamma rays	Carioca	bushy type	34
		Centralia	Canada	1988	cross		earliness	n.i.
		Domino	USA	1987	cross		seed colour	n.i.
		Dresden	Canada		cross		earliness	n.i.
		Eureka	Poland	1991	gamma rays	local ecotype	semi-dwarfness	41
		Fleetwood	Canada	1977	cross		earliness	n.i.
		Frontier	USA	1998	cross		seed colour	n.i.
		FT-Paulistinha	Brazil	1992	cross		yield	42
		Giza 80	Egypt	1980	gamma rays	Fin de Villeneuve	rust resistance	17
		Gratiot	USA	1962	x-rays	Michelite	stiffness	*
		Harkovskaya 8	USSR	1985	gamma rays		seed colour	31
		Harofleet	Canada	1983	cross		earliness	n.i.
		Harokent	Canada	1983	cross		earliness	n.i.
		Huron	USA	1994	cross		seed colour	n.i.
		IAPAR 57	Brazil	1992	cross		GMVD-resistance	40

		JM-126	USA	1986	cross		seed colour	n.i.
		JM-24	USA	1986	cross		seed colour	n.i.
		Kentwood	Canada	1973	cross		earliness	n.i.
		Laker	USA	1983	cross		seed colour	n.i.
		Longyundou 4	China	1994	gamma rays	Heiyundou	yield	n.i.
		Maverick	USA	1997	cross		seed colour	n.i.
		Mayflower	USA	1989	cross		seed colour	n.i.
		Midland	USA	1983	cross		earliness	n.i.
		Mitchell	Canada	1986	cross			34
		Mogano	Italy	1985	EMS	P-224	seed colour	31
		Montalbano	Italy	1985	EMS	P-106	seed colour	31
		Mukhranula	USSR	1982	EI	Mukhranula 4	earliness	40
		NC Alberta Pink	Canada	1998	cross		seed colour	n.i.
		NEP-2	Costa Rica	1975	EMS	San Fernando	seed colour	n.i.
		Neptune	USA	1986	cross		plant architecture	30
		Newport	USA	1995	cross		earliness	n.i.
		Norstar	USA	1993	cross		earliness	n.i.
		Northland	USA	1983	cross		earliness	n.i.
		OAC Seaforth	Canada	1983	cross		earliness	n.i.
		Ouray	USA	1982	cross		bushy type	28
		Pusa Parvati	India	1970	x-rays	Wax podded	earliness	*
		Sanilac	USA	1956	x-rays	Michelite	bushy type	*
		Saparke 75	USSR	1967	gamma rays	Tzanava-31	yield	*
		Seafarer	USA	1967	x-rays	Michelite	earliness	*
		Seaway	USA	1960	x-rays	Michelite	earliness	*
		Stinger	USA	1988	cross		earliness	n.i.
		Suncrest	Canada	1986	cross	Seafarer	earliness	n.i.
		Svetlaya	USSR	1992	MNH	Shchedraya	yield	40
		Swan Valley	USA	1981	cross		seed colour	n.i.
		Unima	FRG	1957	cross		disease resistance	*
		Universal	FRG	1950	x-rays	Granda	earliness	*
		Wesland	USA	1983	cross		earliness	n.i.
Pisum sativum	pea	Agra	Poland	1990	cross		lodging resistance	43

		Bitug	USSR	1990	cross		seed skin quality	40
		Bosman	Poland	1989	cross		afila type	37
		Caoyuan 10	China	1984	gamma rays	Lusecaoyuan	earliness	37
		Diament	Poland	1989	cross			35
		Esedra	Italy	1980	x-rays	Sprinter	lateness	19
		Hamil	Poland	1981	cross		seed tendrilness	18
		Hans	India	1979	EI	P 1163	yield	15
		Heiga	Poland	1986	cross		afila type	30
		Jaran	Poland	1986	cross		afila type	30
		Kwestor	Poland	1991	gamma rays	Paloma	tallness	41
		Mihan	Poland	1983	cross		lodging resistance	26
		Miko	Poland	1989	cross		afila type	35
		Milewska	Poland	1983	cross		lodging resistance	26
		Moskovsky 73	USSR	1974	DES	Nemchonvsky 766	grain size	12
		Navona	Italy	1980	x-rays	Sprinter	lateness	19
		Nemchinovskii 85	USSR	1986	cross		dwarfness	31
		Orphei	USSR	1989	chemical		earliness	40
		Paride	Italy	1988	gamma rays	San Cristoforo	determinate	37
		Piast	Poland	1995	cross		stiffness	43
		Pirro	Italy	1988	gamma rays	Santa Croce	determinate	37
		Priamo	Italy	1988	gamma rays	Alderman	determinate	37
		Ramir	Poland	1985	cross		lodging resistance	26
		Samara	USSR	1992	chemical	Arvika	seed retention	40
		Shikhan	USSR	1984	cross		seed retention	37
		Stral-art	Sweden	1954	x-rays	Kloster	vigour	*
		Streletskii 11	USSR	1985	EI	Zernogradskii mnogop	earliness	31
		Sum	Poland	1979	cross		shortness	15
		Talovets 60	Russia	1993	cross		lodging resistance	41
		Tatarstan 2	USSR	1989	ENH	hybrid seeds	earliness	40
		Trevi	Italy	1985	cross		determinate	35
		Wasata	Poland	1979	gamma rays	Line 5/2	seed tendrilness	15
Polyanthes tuberosa	polyanthes	Rajat Rekha	India	1974	gamma rays	single flowered cv.	leaf colour	14
		Swarna Rekha	India	1974	gamma rays	double flowered cv.	leaf colour	14

Populus trichocarpa	poplar	Donetskii Zolotoi	USSR	1977	gamma rays		variegated leaves	15
Portulaca grandiflora	portulaca	Five Petal	India	1974	gamma rays		flower	20
		Jhumka	India	1974	gamma rays	Karna Pali	flower	14
		Karna Pali	India	1974	gamma rays	Portulaca double	flower	14
		Karna Phul	India	1974	gamma rays	*Portulaca grandiflora*	flower	17
		Lalita	India	1974	gamma rays	Portulaca double	flower	14
		Mukta	India	1974	gamma rays	Portulaca double	flower	14
		Pink colour	India	1974	gamma rays chronic		flower colour	20
		Ratnam	India	1974	gamma rays		flower number	37
		Rosy Green	India	1974	gamma rays chronic		flower morphology	20
		Semi-double	India	1974	gamma rays		flower	20
		Vibhuti	India	1974	gamma rays		flower	14
Prunus armeniaca	apricot	Early Blenheim	Canada	1970	thN	Blenheim	earliness	1
Prunus avium	sweet cherry	Burlat C1	Italy	1983	gamma rays	Bigarreau Burlat	compact growth	31
		Compact Lambert	Canada	1964	x-rays	Lambert	compact growth	*
		Compact Stella 35B11	Canada	1974	x-rays	Stella	compact growth	4
		Ferrovia spur	Italy	1992	x-rays	Ferrovia	shortness	42
		Lapins	Canada	1983	cross		fruit size	25
		Nero II C1	Italy	1983	gamma rays	Durone Nero II	compact growth	31
		Stella	Canada	1968	cross		self-fertile	*
		Sunburst	Canada	1983	cross		fruit size	25
Prunus cerasus	sour cherry	Karlik Samorodka	USSR	1979	gamma rays	Samorodka	dwarfness	18
		Plodorodnaya Michurina	USSR	1977	x-rays	Prunus maackii	fruit set	19
		Polukarlik Orlovskoi	USSR	1979	gamma rays	Orlovskoi Rannei	dwarfness	18
		Polukarlik Turgenevk	USSR	1979	gamma rays	Turgenevka	dwarfness	18
Prunus domestica	plum	Spurdente-Ferco	France	1988	gamma rays	Ente	earliness	35
Prunus dulcis	almond	Supernova	Italy	1987	gamma rays	Fascinello	lateness	32
Prunus persica	peach	Magnif 135	Argentina	1968	gamma rays	Magnif 43	fruit size	*
		Plovdiv 6	Bulgaria	1981	gamma rays	Dupnishka	yield	18
Psathyrostachys juncea	Russian wildrye	Tetracan	Canada	1988	colchicine	(open pollinated)	vigour	43
Punica granatum	pomegranate	Karabakh	USSR	1979	gamma rays			18
		Khyrda	USSR	1979	gamma rays		dwarfness	18

Pyrus communis	pear	Chaofu 1	China	1989	gamma rays	Chaoxianyangli	shortness	n.i.
		Chaofu 10	China	1989	gamma rays	Chaoxianyangli	quality	
		Chaofu 11	China	1989	gamma rays	Chaoxianyangli	lateness	n.i.
		Chaofu 2	China	1989	gamma rays	Chaoxianyangli	quality	
		Fuxiangyanghongdli	China	1983	gamma rays	Xiangyanghong	disease resistance	n.i.
Pyrus pyriforia	japanese pear	Gold Nijisseiki	Japan	1993	gamma rays	Nijisseiki	disease resistance	44
		Kotobuki Shinsui	Japan	1996	gamma rays	Shinsu	disease resistance	44
Raphanus sativus	radish	Qingfu	China	1981	gamma rays	Luoyanglutouqing	yield	n.i.
Rhododendron simsii	azalea	Ingana	Belgium	1984	gamma rays	Inga	flower colour	31
		Osta	FRG	1986	x-rays	Bertina	flower colour	28
Rhododendron	azalea	Adinda	Belgium	1972	x-rays	Karl Glaser	flower colour	6
		Aleida	Netherlands	1978	x-rays	Vuyck's Scarlet	flower colour	14
		Cobalt	Japan	1973	gamma rays	Takasago	dwarfness	*
		Enzet-Rokola	GDR	1969	x-rays	Mme. John Haerens	flower colour	*
		Enzet-Rolko	GDR	1969	x-rays	Ernst Thiers	flower	*
		Eroica	Belgium	1974	gamma and x-rays recurent	Knut Erwen	flower colour	6
		Mevr. R. de Loose	Belgium	1974	gamma and x-rays recurent	de Waele's Favorite	flower colour	6
		Mira	Belgium	1972	gamma and x-rays recurent	Euratom	flower colour	6
		Odilia	Netherlands		x-rays	Silvester	flower colour	34
		Pastorale	Belgium	1973	gamma and x-rays recurent	de Waele's Favorite	flower colour	6
		Saidjah	Belgium	1972	gamma rays	Euratom	flower colour	6
		Sierra Nevada	Belgium	1974	gamma and x-rays recurent	de Waele's Favorite	flower colour	6
		Stefan	Netherlands		x-rays	Silvester	flower colour	34
Ribes nigrum	black currant	Burga	France	1979	gamma rays	Noire de Bourgogne	earliness	29
Ribes sp.	ribes	Westra	FRG	1968	x-rays	Westwick Choice	erectoid type	17
Ricinus communis	castor bean	Aruna	India	1969	thN		earliness	*
		Khersonskaya 10	USSR	1981	chemical		oil content	41
		RC8	India	1978	gamma rays	Rc 1188-54	earliness	11
		Sowbhagya (157-B)	India	1976	cross		earliness	11

Rosa sp.	rose	Abhisarika H.T.	India	1975	gamma rays	Kiss of Fire	flower colour	26
		Angara	India	1975		Montezuma	plant architecture	14
		Beijingzhichun	China	1990	gamma rays	Hongyizhujiao x	flower colour	n.i.
		Beiyumudan	China	1986	gamma rays	Yilishahuanghou (branch)	flower colour	n.i.
		Binghua	China	1986	gamma rays	Beixuaishai x Wuhui (branch &	flower colour	n.i.
		Bridal Sonya	Japan	1985	gamma rays	Sonia	flower colour	32
		Caiyemingxin	China	1986	gamma rays	Mingxin (branch)	leaf morphology	n.i.
		Chuanxiu 1	China	1990	gamma rays	Yangjige (rooted cuttings)	flower colour	n.i.
		Chuanxiu 2	China	1990	gamma rays	Yangjige (young graft)	flower colour	n.i.
		Chuanxiu 3	China	1990	gamma rays	Yangjige (rooted cuttings)	flower colour	n.i.
		Chuanxiu 4	China	1990	gamma rays	Guanghui (rooted cuttings)	flower colour	n.i.
		Chuanxiu 5	China	1990	gamma rays	Guanghui (young graft)	flower colour	n.i.
		Chuanxiu 6	China	1990	gamma rays	Yilishabei (rooted cuttings)	flower colour	n.i.
		Chuanxiu 7	China	1990	gamma rays	Tengheping (graft)	flower colour	n.i.
		Chunyanqifei	China	1989	gamma rays	Ai (branch)	flower colour	n.i.
		Curio	India	1986	gamma rays	Imperator	flower colour	31
		Desi	GDR	1965	x-rays	Gloria Dei	flower colour	*
		Flamingo Queen	Canada	1976	x-rays	Queen Elizabeth	flower colour	17
		Haleihuixin	China	1985	gamma rays	Zhandihuanghua x Haixia (branch & seeds)	flower colour	n.i.
		Hepingzhiguang	China	1986	gamma rays	Heping (branch)	flower colour	n.i.
		Hongdu	China	1984	gamma rays	Lanxia x Lanyue (b & s)	flower colour	n.i.
		Honghuo	China	1986	gamma rays	Ouxiliya x Guonong (b & s)	flower colour	n.i.
		Hongyu	China	1989	gamma rays	Lushimei (branch)	flower colour	n.i.
		Huangjiao	China	1989	gamma rays	Yalishanda (branch)	flower colour	n.i.
		Jiguang	China	1984	gamma rays	Fengheping (branch)	flower colour	31
		Jubian	China	1990	gamma rays	Mubiao	flower colour	n.i.
		Jujing	China	1984	gamma rays	Mohong x Guonong (b & s)	flower scent	n.i.
		Light Pink Prize	India	1989	gamma rays	First Prize	flower colour	37
		Lihui	China	1985	gamma rays	Rongguang (branch)	flower colour	n.i.
		Lubaoshi	China	1984	gamma rays	Beixuaishan x Shiwaitaoyuan (b & s)	sunlight tolerance	n.i.
		Luxin	China	1990	gamma rays	Beixueshan x Luyun (F1 seed)	flower colour	n.i.

		Luye	China	1987	gamma rays	Beixuaishan x Dajiangzhang (b & s)	flower colour	n.i.
		Madhosh	India	1975	EMS	Gulzar	flower colour	14
		Milena	CSFR	1964		Elizabeth Rose	flower colour	14
		Misu-ohmiya	Japan	1990	gamma rays	Queen Elizabeth	flower colour	42
		Nanhailanghua	China	1984	gamma rays	(Langhua x Nanghai)	flower colour	31
		Ohmiyabito	Japan	1990	gamma rays	Queen Elizabeth	flower colour	42
		Paula	USA	1960	gamma rays	Queen Elizabeth	flower colour	31
		Permoser	GDR	1970	radiation	Kordes Perfecta	flower colour	7
		Pink Contempo	India	1986	gamma rays	Contempo	flower colour	31
		Pink Hat	USA	1960	gamma rays	unnamed floribunda	flower colour	31
		Pink-Ilseta	FRG	1985	x-rays	Perl-Ilseta	flower colour	28
		Pusa Christina	India	1975	gamma rays	Christian Dior	flower colour	26
		Qingchunshihuo	China	1989	gamma rays	Yan (branch)	leaf morphology	n.i.
		Saroda	India	1983	gamma rays	Queen Elizabeth	flower colour	23
		September Wedding	Canada	1964	radiation	Montezuma	flower colour	14
		Sharada	India	1983	gamma rays	Queen Elizabeth	flower colour	42
		Shouhong	China	1984	gamma rays	Mohong x Heping (b & s)	flower colour	n.i.
		Striped Christian Di	India	1975	gamma rays	Christian Dior	flower colour	26
		Striped Contempo	India	1983	gamma rays	Contempo	flower colour	37
		Sukumari	India	1983	gamma rays	America's Junior Miss	flower colour	23
		Tangerine Contempo	India	1983	gamma rays	Contempo	flower colour	23
		Twinkle	India	1986	gamma rays	Imperator	flower colour	31
		Xiaguangwandao	China	1984	gamma rays	Lushimei (branch)	flower colour	31
		Xinchao	China	1990	gamma rays	Yidenjing x Yitongji (b & s)	flower colour	n.i.
		Yanhong	China	1984	gamma rays	Mohong x Huancai (b & s)	flower duration	n.i.
		Yellow Contempo	India	1983	gamma rays	Contempo	flower colour	23
		Zhaoyang	China	1984	gamma rays	Yanyangtian x Dajiangzhang (b & s)	flower colour	n.i.
		Zhengzhondajiangzhang	China	1986	gamma rays	Dajiangzhang (branch)	flower colour	n.i.
		Zhengzhouchunse	China	1989	gamma rays	Yalishanda (branch)	flower colour	n.i.
		Zhenjie	China	1984	gamma rays	Xinyong (branch)	flower colour	31
Rubus idaeus	raspberry	Kolokolchik	USSR	1991	ENH	Karnaval (seeds)	disease resistance	41

Saccharum officinarum	sugarcane	Co 6608	India	1966	gamma rays	Co 449	red rot resistance	12
		Co 8153	India	1981	gamma rays	Co 6304 x Co 6806	juice quality	30
		Co 85017	India	1985	gamma rays	Co 740	adaptability	31
		Co 85035	India	1985	gamma rays	Co 740	earliness	32
		Co 997 mutant	India	1967	gamma rays	Co 997	red rot resistance	12
		Guifu 80-29	China	1989	gamma rays	Guitang 72-28	earliness	n.i.
		Nanei	Japan	1981	gamma rays	Ni 1	stalk size	19
		Yuetangfu 83-5	China	1992	gamma rays +	Yuetang 71-210	sugar content	n.i.
Saintpaulia sp.	african violet	Halley	Netherlands	1985	gamma rays	Superba	flower colour	31
Secale cereale	rye	Donar	GDR	1981	PMS	Petkuser Winterroggen Stamm 267/70	shortness	23
		Hankkija's Jussi	Finland	1975	gamma rays	Vjatka	winter hardiness	7
		HJA 6902	Finland	1981	gamma rays	Vjatka	lodging resistance	35
		Pollux	GDR	1981	PMS	Petkuser Winterroggen Stamm 267/70	shortness	23
Sesamum indicum	sesame	Ahnsankkae	Korea	1985	x-rays	Early Russian	disease resistance	29
		ANK-S2	Sri Lanka	1995	gamma rays	MI-1	disease resistance	43
		Babil	Iraq	1992	gamma rays	local variety	earliness	43
		Cairo White 8	Egypt	1992	gamma rays	Giza 24	non-branching	42
		Eshtar	Iraq	1992	gamma rays	local variety	capsule size	43
		Kalika (BM 3-7)	India	1980	EMS	Binayak	semi-dwarfness	17
		Ningya 10	China	1982	gamma rays	Yanza 10	earliness	32
		Pungsankkae	Korea	1996	cross		determinate	43
		Rafiden	Iraq	1992	gamma rays	local variety	earliness	43
		Seodunkkae	Korea	1997	NaN3	Danbaeckkae	disease resistance	44
		Sinai White 48	Egypt	1992	gamma rays	Giza 24	seed colour	42
		Suwon 155	Korea	1998	gamma rays		oil quality	44
		Suwonkkae	Korea	1992	cross		protein content	42
		UMA	India	1990	chemical	Kanak	uniform maturity	43
		USHA	India	1990	chemical	Kanak	yield	43
		Yangbaeckkae	Korea	1995	NaN3	Danbaeckkae	oil quality	42
Setaria italica	foxtail millet	Lugu 7	China	1987	gamma rays	Lugu 2	shortness	33
Setaria sp.	millet	Angu 221	China	1978	gamma rays	Ange 4	earliness	27
		Changwei 74	China	1974	gamma rays	Shuilihun	glutinous	29

		Changwei 75	China	1975	gamma rays	Changwei 69	blast resistance	29
		Chigu 4	China	1987	fN	Shaogu 1	grain quality	n.i.
		Fugu 3	China	1989	gamma rays	Honggu	yield	n.i.
		Fugu 4	China	1992	gamma rays	Honggu	yield	n.i.
		Fugu 6	China	1999	gamma rays	Fugu 3	lodging resistance	n.i.
		Jingu 15	China	1981	gamma rays		earliness	n.i.
		Jingu 21	China	1991	gamma rays		lodging resistance	n.i.
		Longgu 27	China	1988	fN	Lanfan 1	panicle size	n.i.
		Longgu 28	China	1989	fN	Yuan 12n.i.	drought tolerance	n.i.
		Longgu 29	China	1992	fN	Ji 12n.i.	lodging resistance	n.i.
		Lugu 2	China	1991	gamma rays	Jinfeng 69	yield	n.i.
		Nunxuan 11	China	1985	cross		drought tolerance	n.i.
		Nunxuan 12	China	1986	fN	Xiaoyijiu	drought tolerance	n.i.
		Nunxuan 14	China	1992	gamma rays	hybrid	lodging resistance	n.i.
		Yugu 6	China	1995	cross		disease resistance	n.i.
		Zhangnong 10	China	1966	gamma rays	Hongshizhu	grain morphology	27
		Zhangnong 11	China	1966	gamma rays	Hongshizhu	logging resistance	27
		Zhufu 1	China	1974	gamma rays	Moligu	adaptability	27
Sinapis alba	mustard	RLM 198	India	1975	radiation	RL 18	oil content	7
		Seco	Sweden	1961	cross		yield	6
		Svalof's Primex	Sweden	1950	x-rays	Svalöf's White mustard	yield	*
		Trico	Sweden	1967	x-rays		yield	6
		Zlata	Czech Rep.	1996	x-rays	Prerovska Bila	earliness	43
Solanum khasianum	khasianum	RRL-20-2	India	1975	gamma rays	Dehradun local	solasodine	13
Solanum melongena	eggplant	Floralba	Italy	1985	EMS	Florida Market	shortness	32
		Macla	Italy	1983	EMS	Florida Market	shortness	32
		Picentia	Italy	1983	EMS	Lunga Violetta	shortness	32
		PKM 1	India	1985	gamma rays	Puzhuthikathiri	yield	32
Solanum tuberosum	potato	Desital	Italy	1987	gamma rays	Desirée	skin colour	31
		Konkei No.n.i.	Japan	1973	x-rays		skin colour	*
		Mariline 2	Belgium	1968	x-rays	Mariline	yield	*
		Sarme	Estonia	1993	cross		lateness	43
Sorghum bicolor	sorghum	Co 21	India	1977	x-rays	CSV-5	yield	29

		Djeman	Mali	1998	gamma rays	CSM 228	grain colour	44
		Djemanin	Mali	1998	gamma rays	CSM 228	grain colour	44
		Donetskaya 5	USSR	1984	DMS	Krupnosemyannaya 3	shortness	31
		Fambe	Mali	1992	gamma rays	CSM 388	lodging resistance	44
		Gnome	Mali	1998	gamma rays	IPS 0001	lodging resistance	44
		Gnoumanin	Mali	1998	gamma rays	CSM 228	grain colour	44
		Jinfu 1	China	1970	gamma rays	Jingza 5	grain quality	27
		Jinza 1	China	1973	cross		lodging resistance	25
		Longfuliang 1	China	1979	gamma rays	Xinliang 7	earliness	25
		Sadje	Mali	1998	gamma rays	Isunikakiyan	earliness	44
		Sofin	Mali	1998	gamma rays	CSM 388	earliness	44
		Tiedjan	Mali	1998	gamma rays	CSM 228	panicle size	44
Sorghum durra	durra	Volzhskoye 4	USSR	1989	MNH		shortness	40
Sorghum sudanense	sudan grass	Mironovskaya 8	USSR	1990	cross		earliness	41
Spinacia oleracea	spinach	Lavewa	FRG	1987	EMS	Früh-Remona	nitrate content	37
Stenotaphrum	st. Augustine grass	TXSA 8202	USA	1985	gamma rays	Floratam	disease resistance	31
		TXSA 8212	USA	1985	gamma rays	Floratam	disease resistance	31
Streptocarpus sp.	streptocarpus	Albatros	Netherlands	1973	colchicine	mutant 7111 of Maerssen's White	flower morphology	17
		Aurora	FRG	1979	x-rays	Neptun rosa = Carmen	flower colour	37
		Blue Nymph	Netherlands	1969	x-rays	Constant Nymph	flower colour	*
		Blue Windor	FRG	1986	x-rays	Margaret	flower colour	31
		Burgund	FRG	1978	x-rays	Juwel	flower colour	14
		Cobalt Nymph	Netherlands	1969	x-rays,	Constant Nymph	plant architecture	*
		Dark Windor	FRG	1987	x-rays	Margaret	flower colour	31
		Dolly	FRG	1979	x-rays	Neptun blau = Cupido	plant architecture	37
		Freya	FRG	1979	x-rays	Neptun rosa = Carmen	flower colour	37
		Gloria Rot	FRG	1978	x-rays	Gloria rosa	flower colour	14
		Helle Glocke	FRG	1979	x-rays	Nadja	flower colour	37
		Jewel	FRG	1978	x-rays	Laura	flower colour	14
		Kefora	FRG	1977	x-rays	Constant Nymph	plant architecture	10
		Margaret	UK	1974	x-rays	Constant Nymph	earliness	17
		Mini Nymph	Netherlands	1969	x-rays	Constant Nymph	plant architecture	*
		Minidor	FRG	1987	x-rays	Mini Nymph	flower colour	31

		Mutara	FRG	1977	x-rays	Constant Nymph	plant architecture	10
		Nanna	FRG	1979	x-rays	Neptun blau = Cupido	compact growth	37
		Neptun Rosa	FRG	1978	x-rays	Neptun	flower colour	14
		Netta Nymph	Netherlands	1969	x-rays	Constant Nymph	flower colour	*
		Nicky	FRG	1979	x-rays	Neptun	flower colour	16
		Purple Nymph	Netherlands	1969	x-rays,	Constant Nymph	flower	5
		Rosalie	FRG	1979	x-rays	Juwel	flower colour	37
		Rosalinda	FRG	1978	x-rays	Juwel	flower colour	14
		Selene	FRG	1979	x-rays	Hera	flower colour	37
		Snow-white	Netherlands	1973	x-rays	Maerssen's White	dwarfness	*
		Vando	FRG	1987	x-rays	Cynthia	flower colour	31
		Violetta	FRG	1977	x-rays	Constant Nymph	flower colour	10
		Weisse Glocke	FRG	1978	x-rays	Helle Glocke	flower colour	14
		White Windor	FRG	1985	x-rays	Margaret	flower colour	31
Syringa vulgaris	lilac	Prairie Petite	USA	1995	thN		dwarfness	44
Trifolium alexandrinum	egyptian clover	BL-22	India	1984	gamma rays	Mescavi	lateness	26
Trifolium incarnatum	crimson clover	Cardinal	CSFR					6
Trifolium pratense	red clover	Rotra, R.v.P	Belgium	1967	colchicine		yield	*
Trifolium subterraneum	subterranean clover	Uniwager	Australia	1967	EMS	Geraldton	isoflavons content	*
Triticum aestivum	wheat	092	China	1966	gamma rays	Nanda 2419	earliness	25
		1161	China	1966	gamma rays	Nanda 2419	cold tolerance	25
		352	China	1983	laser	470	earliness	27
		503	China	1975	gamma rays	Jiulan	tillering type	27
		62-10	China	1985	fN	Abbodanza	rust resistance	30
		62-8	China	1985	fN	Abbodanza	rust resistance	30
		77 L15	China	1983	laser	F1 (Zhengyin 1 x Shangjian)	stiffness	27
		78 A	China	1986	gamma rays	-	grain quality	n.i.
		Albidum 12	USSR	1984	gamma rays	Triticum-Agropyron hybrid 870	cold tolerance	31
		Altimir 67	Bulgaria	1979	gamma rays	Skorospelka x Mexipak	disease resistance	16
		Bakhtawar-92	Pakistan	1994	gamma rays		disease resistance	44
		Bel'chanka 5	USSR	1992	cross		lodging resistance	40
		Birlik	USSR	1989	cross		lodging resistance	40
		BR4	Brazil	1979	cross		yield	26

Carolina	Chile	1981	gamma rays	Collafen	yield	19
Changwei 19	China	1978	gamma rays	Maoyinafu	disease resistance	25
Changwei 20	China	1978	gamma rays	Maoyinafu	disease resistance	25
Changwei 51503	China	1983	gamma rays	Xiangyang 1 x Heimangmai	tillering type	27
Chuanfu 1	China	1982	beta rays	Chuanyu 5	earliness	27
Chuanfu 2	China	1989	gamma rays	F1 (Chuanfu 1 x 78-2882)	disease resistance	37
Chuanfu 3	China	1989	gamma rays	F1 (Bamai 18 x 79P-600)	disease resistance	37
Chuanfu 4	China	1993	gamma rays	(Chuanfu 1x 78-2882)	yield	n.i.
Claudia (=Mv 8)	Italy	1979	cross			16
Darkhan-35	Mongolia	1992	cross		protein content	44
Darkhan-49	Mongolia	1995	cross		yield	44
Deda	USSR	1983	MNH	Motchynave	earliness	31
Dnestryanka	USSR	1989	cross		shortness	40
Els	FRG	1960	x-rays	Erli x Lichti früh x Triticum	shortness	9
Emai 6	China	1966	gamma rays	Nanda 2419	rust resistance	25
Emai 9	China	1980	gamma rays	selected line from Emai 6	Gibberella	27
Eritrospermum 103	USSR	1982	gamma rays,	Lutestsens 62	earliness	40
Fuer	China	1977	gamma rays	Keshibaipi x 774 Strain	rust resistance	27
Fuou 1	China	1974	gamma rays	Ourou	rust resistance	n.i.
Fusheabo 1	China	1987	fN	Abo	rust resistance	37
Ganchun 20	China	1998	gamma rays	hybrid	grain quality	n.i.
Guifu 12	China	1986	cross		rust resistance	n.i.
Hankkijas Taava	Finland	1978	gamma rays	Ruso	yield	13
Heichun 2	China	1979	cross		earliness	27
Henong 1	China	1985	gamma rays	Yangmai 1	yield	30
Hezu 8	China	1992	gamma rays	Zhefu 908 (immature embryo)	yield	41
Humai 3	China	1978	gamma rays	Yangmai 1	earliness	27
IAS 63	Brazil	1974	cross		yield	19
Inna	USSR	1991	cross		lodging resistance	40
Intesar	Iraq	1992	gamma rays	Saber Beg	yield	43
Iratom	Iraq	1992	gamma rays	Saber Beg	yield	43
Jauhar-78	Pakistan	1979	fN	Nayab	yield	18
Jiaxuan 1	China	1974	gamma rays	Maoyingafu	salt tolerance	27

Jienmai 2	China	1970	gamma rays	Beijing 6	earliness	25
Jihe 02	China	1993	cross		drought tolerance	n.i.
Jimai 28	China	1988	gamma rays	Fanxiu 4	cold tolerance	n.i.
Jingfen 1	China	1976	gamma rays	Shijiazhuang 63	earliness	25
Jingmai 34	China	1990	gamma rays		drought tolerance	n.i.
Jingmai 35	China	1991	gamma rays	K239 x 5084	shortness	n.i.
Jinmai 22	China	1982	cross		earliness	35
Jinmai 23	China	1980	gamma rays	(Fengchan 2 x Bima 4) x Nanda 2419	earliness	n.i.
Kazanskaya 84	USSR	1992	MNH	[Velut.97xAlbid.114]	winter hardiness	40
Kexing 15	China	1972	gamma rays	landrace	rust resistance	27
Khara-86	Mongolia	1986	gamma rays	Orkhon	earliness	44
Kharkovskaya 90	USSR	1991	cross		lodging resistance	40
Khersonskaya 86	USSR	1991	cross		lodging resistance	40
Kiran-95	Pakistan	1996	cross		yield	n.i.
Kiyanka	USSR	1981	dES	Mironovskaja jubilee	yield	25
Kormovaya 30	USSR	1983	NMH	Belotcherkovskaya	silage quality	31
Lewis	USA	1964	thN	Mo. W6185	stiffness	*
Ljubov	USSR	1985	laser	Leningradka	yield	35
Longfumai 1	China	1984	fN	(Xinshuguang 1 x Liaochun 8)	earliness	30
Longfumai 2	China	1986	gamma rays	(Nongxi 35 x Ke 250)	earliness	32
Longfumai 3	China	1987	gamma rays	(Nongfu 77-4096 x S-A-25)	earliness	32
Longfumai 4	China	1988	gamma rays	(Heizia 266 x Ke 79F3-392)	earliness	n.i.
Longfumai 5	China	1992	beta rays	Jiusan B 29-4	earliness	41
Longfumai 6	China	1994	gamma rays	hybrid	disease resistance	n.i.
Longfumai 7	China	1996	gamma rays	K202 (young spike)	grain quality	n.i.
Longfumai 9	China	1999	gamma rays	Kejian 23	grain quality	n.i.
Lumai 11	China	1988	cross		drought tolerance	n.i.
Lumai 16	China	1990	laser	(Gao 8 x Yanda 72-629)	lodging resistance	n.i.
Lumai 20	China	1993	gamma rays	321E (pollen)	earliness	n.i.
Lumai 4	China	1983	laser	70-4-92-1	earliness	32
Lumai 5	China	1984	cross		shortness	32
Lumai 6	China	1984	laser	70-4-92-1	earliness	32
Lumai 8	China	1985	cross		yield	32

Luten 1	China	1968	gamma rays	Huixianhong	semi-dwarfness	25
Lutestsens 7	USSR	1991	cross		seed retention	40
Meshenskaya	USSR	1989	MNH	[Chern.xMiron.Yubil.]	winter hardiness	40
Moskovskaya 70	USSR	1991	cross		lodging resistance	40
Moskovskaya nizkosteb.	USSR	1990	cross		lodging resistance	40
Motsinave 100	USSR	1980	gamma rays			37
Mriya Khersona	USSR	1989	cross		lodging resistance	40
Mv 8	Hungary	1978	cross		shortness	16
Nanjing 3	China	1976	gamma rays	St 1472/506	shortness	19
Nanyang 75-6	China	1979	gamma rays ,	F2 (St 2422/n.i.4 x Neixiang 5)	uniformity	25
Nechinovskaya 86	USSR	1991	cross		lodging resistance	40
Neimai 5	China	1979	gamma rays	[(Ourou x Liaochun 1) x Ruluo]	earliness	27
Nemchinovskaya 52	USSR	1990	cross		lodging resistance	40
NI-5643	India	1975	radiation	[New Thatch x NI-284-S]	earliness	19
Ningmai 3	China	1973	gamma rays	St1472/506	shortness	25
Nishte-95	Pakistan	1995	gamma rays			44
Novosibirskaya 67	USSR	1969	gamma rays	Novosibirskaja 7	stiffness	*
NP 836	India	1961	x-rays	NP 799	awned	*
Odesskaja 75	USSR	1975	cross		shortness	14
Odesskaja Polukarlik	USSR	1975	cross		semi-dwarfness	14
Omskaya ozimaya	USSR	1989	EI		winter hardiness	40
Payne	USA	1981	cross		disease resistance	19
Pitikul	USSR	1982	cross		lodging resistance	40
Polukarlik 3	USSR	1985	cross		lodging resistance	40
Polukarlikovaja-49	USSR	1979	cross		shortness	13
Progress	USSR	1984	cross		lodging resistance	40
Pusa Lerma	India	1971	gamma rays	Lerma rojo 64-A	grain colour	*
Qicheng 115	China	1985	gamma rays	F1 (Qifu 04 x Yaan 74-550)	stiffness	32
Qichun 1	China	1971	cross		drought tolerance	27
Qinchun 415	China	1993	gamma rays	Abuo	stress tolerance	n.i.
Qinghai 570	China	1996	gamma rays	hybrid	grain quality	n.i.
Qinmai 6	China	1983	laser	F1 (Zhengying 1 x Shanqian)	stiffness	n.i.
Qunzhong 42	China	1968	gamma rays	Nannoundaheimang	earliness	25

Rabia	Iraq	1994	gamma rays	F3 (Saber Beg x HD)	yield	43
Sali	Iraq	1994	gamma rays	F3 (Saber Beg x Lachis)	yield	43
Schedraj Polesja	USSR	1987	MNH	Poleskaya 70	yield	31
SGT 17	USSR	1980	gamma rays			37
Shannongfu 63	China	1980	gamma rays	F4 (Youbao x Ourou)	earliness	19
Sharbati Sonora	India	1967	gamma rays,	Sonora 64	grain colour	6
Shirowase komugi	Japan	1977	gamma rays	Shirogane komugi	plant type	21
Sibirskaya niva	USSR	1992	EI	PPG-186	winter hardiness	40
Sinvalocho Gama	Argentina	1962	gamma rays	Sinvalocho	rust resistance	*
Sirius	FRG	1969	cross		stiffness	9
Skifyanka	USSR	1992	chemical	sel. from Spartanka	lodging resistance	40
Soghat 90	Pakistan	1991	NaN3	Pavon	disease resistance	42
Spartanka	USSR	1988	cross		lodging resistance	40
Spinnaker	Italy	1987	fN	Anza	lodging resistance	37
Stadler	USA	1964	thN	Mo. W6243	earliness	*
Taifu 1	China	1966	gamma rays	Nounda 183	earliness	25
Taifu 10	China	1968	gamma rays	F2 (Nongda 183 x Neixiang 5)	drought tolerance	27
Taifu 15	China	1968	gamma rays	Nongda 183	earliness	27
Taifu 22	China	1968	gamma rays	F2 (Nongda 183 x Neixiang 5)	tillering type	27
Taifu 23	China	1968	gamma rays	F2 (Nounda 183 x Neixiang 5)	drought tolerance	25
Tambo	Switzerland	1985	gamma rays	(Probus x Bankuti)xHoeser 52	shortness	30
Tammuz-2	Iraq	1992	fN	F2 (Mexipak x Saber Beg)	yield	43
Tammuz-3	Iraq	1992	fN	F2 [Saber Beg x (Mexipak x Abughjraib 3)]	yield	43
Tatara	Pakistan	1996	gamma rays		drought tolerance	44
Wanmai 32	China	1997	ion beams	Yangmai 158	plant type	n.i.
Wanyuan 28-88	China	1979	gamma rays	F2 (St2422/n.i.4 x Neixiang 5)	shortness	25
Wanyuan 75-6	China	1979	gamma rays,	F2 (St2422/n.i.4 x Neixiang 5)	earliness	27
Wei 9133	China	1993	fN	70-4-92-1	lodging resistance	n.i.
Weifu 6757	China	1986	gamma rays	F1 (Taishan 1 x Shanqianmai)	rust resistance	32
Wuchun 3	China	1973	cross		drought tolerance	27
Xiaoyan 6	China	1979	laser	St 2422/n.i.4 x Xiaoyan 96	rust resistance	27
Xifu 3	China	1977	gamma rays	NP 824	disease resistance	27
Xifu 4	China	1980	cross		drought tolerance	37

Xifu 5	China	1985	cross		yield	37
Xifu 6	China	1989	fN	Xifu 4	earliness	n.i.
Xifu 7	China	1989	gamma rays	Xifu 4	earliness	n.i.
Xifu 8	China	1991	gamma rays	(Afunuoer x Fan 7)	spike size	n.i.
Xinchun 2	China	1984	gamma rays	(Siete Cerros x Qichun 4)	earliness	32
Xinchun 3	China	1986	gamma rays	(Siete Cerros x Qichun 4)	yield	n.i.
Xingchun 6	China	1993	cross		yield	n.i.
Xingchun 7	China	1997	cross		yield	n.i.
Xingdong 19	China	1995	gamma rays	hybrid	disease resistance	n.i.
Xinongmai 2	China	1993	gamma rays	77-2882	earliness	44
Xinshukuang 1	China	1971	gamma rays	F3 (Abo M4 x Ourou)	disease resistance	25
Yanfuzao	China	1984	gamma rays ,	Yekaola	earliness	n.i.
Yangmai 158	China	1993	gamma rays	hybrid	yield	n.i.
Yannoun 685	China	1974	cross		rust resistance	25
Yuanchun 7112	China	1975	cross		yield	18
Yuandon 2	China	1982	gamma rays	[12040 x Afunuoer]	earliness	27
Yuandong 1	China	1979	gamma rays	[Zaoyang x Dongfenhong 3]	earliness	25
Yuandong 3	China	1989	gamma rays	hybrid	rust resistance	30
Yuandong 772	China	1977	gamma rays	[11141 x 12040]	yield	18
Yuandong 7848	China	1978	gamma rays	[12040 x Aurora]	yield	18
Yuandong 94	China	1984	gamma rays	[12040 x Ourou]	earliness	30
Yuanfeng 1	China	1968	gamma rays	Bima 4	cold tolerance	25
Yuanfeng 2	China	1969	gamma rays	Bima 4	cold tolerance	25
Yuanfeng 3	China	1972	gamma rays	Afu	cold tolerance	25
Yuanfeng 4	China	1978	gamma rays	Taishan 1	shortness	25
Yuanfeng 5	China	1985	gamma rays	[(Nuofulin 13 x Youbao 57) x Xiayingsu]	earliness	37
Yuangnong 53	China	1971	gamma rays	F3 (Yuangnong 39 x Ourou)	stiffness	18
Yuangnong 61	China	1971	gamma rays	F3 (Yuangnong 39 x Ourou)	yield	18
Yuanyuan 18-37	China	1987	gamma rays ,	F1 (St2422/n.i.4/Neixiang 5)	yield	n.i.
Yubileinaya 75	USSR	1992	cross		seed size	40
Yumai 12	China	1988	gamma rays	Bounong 7023	earliness	n.i.
Yumai 4	China	1984	gamma rays	Afu strain	earliness	n.i.
Yumai 43	China	1996	gamma rays	hybrid	disease resistance	n.i.

		Yunfu 2	China	1982	cross		earliness	27
		Yunfuzao	China	1980	gamma rays	[(Fengchen 2 x Bima 4) x Nanda 2419]	earliness	25
		Yunnat odesskii	USSR	1989	cross		lodging resistance	40
		Yuyuan 1	China	1979	gamma rays	F2 (St2422/n.i.4 x Neixiang 5)	earliness	25
		Zenkouzikomugi	Japan	1969	gamma rays	Igachikugo-Oregon	earliness	*
		Zhangchun 10	China	1987	cross		lodging resistance	n.i.
		Zhangchun 12	China	1990	gamma rays	Gamma 47-3-1	earliness	n.i.
		Zhangchun 13	China	1991	cross		shortness	n.i.
		Zhangchun 14	China	1991	cross		earliness	n.i.
		Zhangchun 17	China	1998	gamma rays	hybrid	earliness	n.i.
		Zhangchun 18	China	1998	gamma rays	hybrid	drought tolerance	n.i.
		Zhemai 3	China	1983	laser	E-70	earliness	32
		Zhemai 4	China	1989	laser	[1-3-2 x 9-14-3-1]	spike number	n.i.
		Zhemai 5	China	1991	gamma rays	[Zheng 7495 x Anhui 11]	earliness	n.i.
		Zhengliufu	China	1976	gamma rays	Zhengzhou 6	drought tolerance	25
		Zhonga 1	China	1969	gamma rays	Afu	cold tolerance	27
		Zhonghong 1	China	1977	fN	Hongmang	grain quality	n.i.
		Zlatostrui	Bulgaria	1985	gamma rays	F2 (Mexican 225 x Sadovo 1)	yield	32
T. turgidum ssp. *durum*	durum	Arpad	Austria	1987	cross		shortness	30
		Attila	Austria	1980	cross		shortness	16
		Augusto	Italy	1976	cross		yield	10
		Cargidurox	France	1981	EMS	K6800707	shortness	21
		Castel del Monte	Italy	1969	fN	Grifoni	stiffness	*
		Castelfusano	Italy	1968	thN	Capelli	stiffness	*
		Castelnuovo	Italy	1971	x-rays	Carigliano	stiffness	*
		Castelporziano	Italy	1968	thN	Capelli	stiffness	*
		Creso	Italy	1974	cross		stiffness	6
		Febo	Italy	1982	cross		yield	37
		G-0367	Greece	1970	thN	YG-3688	shortness	16
		Gergana	Bulgaria	1984	gamma rays		lodging resistance	37
		Giano	Italy	1982	cross		yield	37
		Grandur	Austria	1980	cross		shortness	16
		Icaro	Italy	1987	fN	Anhinga	shortness	35

		Lozen 76	Bulgaria	1982	cross		yield	20
		Mida	Italy	1974	cross		stiffness	6
		Peleo	Italy	1988	cross		shortness	37
		Probstdorfer Miradur	Austria	1978	cross		yield	13
		Signadur	Austria	1984	cross		shortness	26
		Sredetz	Bulgaria	1988	cross		yield	33
		Tito	Italy	1975	cross		stiffness	6
		Ulisse	Italy	1988	cross		shortness	37
		Unidur	Austria	1984	cross		stiffness	29
		Zeveryana	Bulgaria	1986	cross		shortness	33
Tulipa sp.	tulip	Den' Pobedy	Russia	1993	chemical	London	decorative flower	41
		Dominique	Netherlands	1985	x-rays	Lustige Witwe	flower colour	31
		Estella Rijnveld	Netherlands	1954	x-rays	Red Champion	flower colour	17
		Faraday	Netherlands	1949	x-rays	Fantasy	flower colour	17
		Ivette	Netherlands	1985	x-rays	Lustige Witwe	flower colour	31
		Orange Charles	Netherlands	1985	x-rays	Charles	flower colour	31
		Rimo	Netherlands	1985	x-rays	Lustige Witwe	flower colour	37
		Santina	Netherlands	1985	x-rays	Lustige Witwe	leaf morphology	37
		Yvonne	Netherlands	1985	x-rays	Lustige Witwe	flower colour	31
Vicia faba	faba bean	Babylon	Iraq	1994	gamma rays	Ekwadelgii	disease resistance	43
		Bronto	Poland	1989	gamma rays	Nadwislanski	yield	37
		Chabanskye	USSR	1985	cross		earliness	31
		Dino	Poland	1987	gamma rays	Nadwislanski	shortness	31
		Karna	Austria	1983	gamma rays	Kornberg Kleinkönige	yield	29
		KYU-82	USSR	1987	chemical	line 2193 (Germany)	disease resistance	31
		Martin	Poland	1994	cross		earliness	43
		Prikarpatskie 4	USSR	1986	ENH,MNH,D	[Prikarpatskie 2]	yield	40
		Severinovskie 1	USSR	1992	MNH	[KYU-82 x Fribo]	protein content	40
		Stego	Poland	1987	gamma rays	Nadwislanski	shortness	31
		Tinos	Poland	1992	cross		determinate	41
		Ti-Nova	GDR	1986	cross		terminal	30
		Tuwaitha	Iraq	1994	gamma rays	local variety	disease resistance	43
Vicia sativa	vetch	Nechinovskaya 84	USSR	1989	DES	VIR K-33583	leaf size	40

		Nikian	Italy		EMS	Mirabella	branching	43
		Toplesa	CSFR	1995	cross		vigour	43
Vigna angularis	azuki bean	Beni-nambu	Japan	1978	gamma rays	Mombetsu 26	earliness	21
Vigna mungo	black gram	Binamash-1	Bangladesh	1994	gamma rays	BINA Acc.B-10	disease resistance	43
		Co 4	India	1978	MMS	Co 1	earliness	29
		TAU 1	India	1985	cross		yield	28
		TPU-4	India	1992	cross		grain weight	42
Vigna radiata	mungbean	Binamoog-2	Bangladesh	1994	cross		seed size	43
		Binamoog-3	Bangladesh	1997	gamma rays		yield	n.i.
		Binamoog-4	Bangladesh	1997	gamma rays		yield	n.i.
		Binamoog-5	Bangladesh	1998	gamma rays		yield	n.i.
		Camar	Indonesia	1987	gamma rays	Manyar	Cercospora	42
		Co 4	India	1982	gamma rays	Co-1	yield	29
		ML 26-10-3	India	1983	gamma rays	ML-26	YMV resistance	33
		MUM-2	India	1992	EMS	K-851	yield	43
		NIAB Mung 121-25	Pakistan	1985	gamma rays	RC 71-27	earliness	30
		NIAB Mung 13-1	Pakistan	1986	gamma rays	6601	earliness	29
		NIAB Mung 19-19	Pakistan	1985	gamma rays	Pak 22	earliness	30
		NIAB Mung 20-21	Pakistan	1986	gamma rays	Pak 22	earliness	29
		NIAB Mung 51	Pakistan	1990	gamma rays	[6601x1973A]	earliness	42
		NIAB Mung 54	Pakistan	1990	gamma rays	[6601x1973A]	earliness	42
		NIAB Mung 92	Pakistan		cross		disease resistance	44
		NIAB Mung 98	Pakistan		cross		seed size	44
		NIAB Mung-28	Pakistan	1983	gamma rays	Pak 17	earliness	23
		Pant Moong 2	India	1982	gamma rays	ML-26	virus resistance	23
		TAP-7	India	1982	gamma rays	S-8	earliness	23
Vigna unguiculata	cowpea	Co 5	India	1986	gamma rays	Co-1	nutritional	29
		Cowpea-88	India	1990	radiation		yield	37
		ICV 11	Kenya	1985	gamma rays	ICV 1	semi-erect type	28
		ICV 12	Kenya	1985	gamma rays	ICV 1	yield	28
		Uneca-Gama	Costa Rica	1986	gamma rays	Centa	yield	34
		V16 (Amba)	India	1981	DMS	Pusa Phalguni	yield	25
		V240	India	1984	DMS	Pusa Phalguni	yield	25

		V37 (Shreshtha)	India	1981	DMS	Pusa Phalguni	yield	25
		V38 (Swarna)	India	1984	DMS	Pusa Phalguni	yield	25
Vitis vinifera	grape	Fikreti	USSR	1986	gamma rays	Marandi	earliness	32
Weigela	weigela	Couleur d'Automne Co	France	1979	gamma rays	La Printemps	variegated leaves	25
		Courtadur	France	1980	gamma rays	Bristol Ruby	compact growth	31
		Rubivif Courtavif	France	1980	gamma rays	Bristol Ruby	flower colour	25
Zea mays	maize	CE 200	CSFR	1979	gamma rays	synthetic population	yield	17
		CE 268	CSFR	1979	gamma rays	synthetic population	yield	17
		CE 330	CSFR	1979	gamma rays	synthetic population	yield	17
		Changdan 3	China	1985	cross		earliness	n.i.
		Collectivnii 210 ATV	USSR	1984	cross		earliness	30
		De 2205 SC	Hungary	1987	cross		earliness	37
		DT-6	Vietnam	1990	gamma rays,	Tuxpeño	earliness	43
		DT-8	Vietnam	1990	cross		earliness	43
		Guidan 15	China	1991	cross		earliness	n.i.
		Huafeng 100	China	1976	gamma rays	[Hua 160 x Fengke 1]	ear lower on stem	41
		Hybrid ChK 3 -18 TV	USSR	1991	cross		earliness	41
		Hybrid ChKG 280 MV	USSR	1992	cross		disease resistance	40
		Jidan 1	China	1967	cross		blight resistance	27
		Jidan 101	China	1967	cross		root system	25
		Keduo 6	China	1991	cross		yield	n.i.
		KNEJA-510 (hybrid)	Bulgaria	1982	cross		yield	32
		KNEJA-641 (hybrid)	Bulgaria	1982	cross		yield	32
		KNEJA-666 (hybrid)	Bulgaria	1987	cross		silage quality	32
		KNEJA-674	Bulgaria	1989	cross		yield	41
		KNEJA-HP-556(hybrid)	Bulgaria	1981	cross		protein content	32
		KNEJA-HP-633(hybrid)	Bulgaria	1980	cross		protein content	32
		KNEJA-M-712 (hybrid)	Bulgaria	1987	cross		yield	32
		Knezha MHP 556	Bulgaria	1982	cross			37
		Kollectivnyi 210 (hy	USSR	1982	cross		earliness	40
		Kollektivnyi 100 TV h	USSR	1988	cross		earliness	40
		Kollektivnyi 100SV	USSR	1988	cross		earliness	41
		Kollektivnyi 225 MV h	USSR	1990	cross		earliness	40

Kollektivnyi 244 MV h	USSR	1986	cross		earliness	40
Kollektivnyi 95 M h	USSR	1992	cross		earliness	40
Krasnodarskii 303 VK	USSR	1984	cross		lodging resistance	40
Lauyu 5	China	1985	cross		earliness	31
Liaoyangbei	China	1991	gamma rays	population	disease resistance	n.i.
Liaoyuan 1	China	1988	cross		disease resistance	n.i.
Longbaoyu 1	China	1990	cross		yield	n.i.
Longfuyu 1	China	1984	cross		yield	31
Longfuyu 2	China	1987	cross		grain quality	n.i.
Longfuyu 3	China	1992	cross		disease resistance	n.i.
Ludan 50	China	1998	cross		yield	n.i.
Lude 5	China	1991	gamma rays	hybrid	stress tolerance	n.i.
Luyu 12	China	1993	cross		disease resistance	n.i.
Luyu 3	China	1980	cross		disease resistance	25
Luyu 5	China	1987	cross		earliness	33
Luyuan SC 4	China	1976	gamma rays	Wu SC early	yield	19
Luyuan SC 9	China	1987	cross		earliness	33
Luyuandan 1	China	1976	cross		disease resistance	25
Luyuandan 14	China	1997	cross		lodging resistance	n.i.
Luyuandan 16	China	1995	cross		disease resistance	n.i.
Luyuandan 3	China	1976	cross		disease resistance	27
Luyuandan 4	China	1976	cross		earliness	27
Luyuandan 5	China	1993	cross		earliness	n.i.
Luyuandan 7	China	1981	cross		cob size	25
Luyuanshan 2	China	1981	cross		disease resistance	25
Mudan 7	China	1983	cross		earliness	n.i.
Xiangsan 1	China	1980	cross		disease resistance	27
Xinnongfuyu 1	China	1987	cross		vigour	n.i.
Xinongdanjiao 1	China	1991	cross		disease resistance	n.i.
Xinyu 3	China	1986	cross		grain quality	n.i.
Yuan 74-751	China	1974	gamma rays +	Tangszupintou x Ye 2	plant type	18
Yuan 79-171	China	1979	gamma rays	Kung 70 (pollen)	shortness	18
Yuan 79-418	China	1979	fN	(A96 x Daqiu 36 x B 64)	earliness	18

		Yuanlian 5	China	1980	cross		earliness	25
		Yuanqi 123	China	1978	cross		earliness	33
		Yuanqi 722	China	1978	cross		earliness	33
		Yuanwu 02	China	1975	gamma rays	Wudanzao	earliness	41
		Yubileinyi 60 (hybri	USSR	1982	cross		stiffness	40
		Yubileinyi 60 MV h	USSR	1986	cross		earliness	40
		Zhongyuandan 32	China	1997	cross		quality	n.i.
		Zhongyuandan 4	China	1982	cross		earliness	25
Ziziphus mauritiana	indian jujube	Dao tien	Vietnam	1986	MNH	Tien Phien	earliness	34
		Ma hong	Vietnam	1986	MNH		fruit morphology	34

*/ Sigurbjörnsson and Micke, 1974
n.i./ will be published in next issues of MBNL

Mutation Breeding Review
Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture
and FAO/IAEA Agriculture and Biotechnology Laboratory, Seibersdorf
International Atomic Energy Agency
Wagramer Strasse 5, P. O. Box 100
A-1400 Vienna, Austria

Printed by the IAEA in Vienna
December 2000

00-05026