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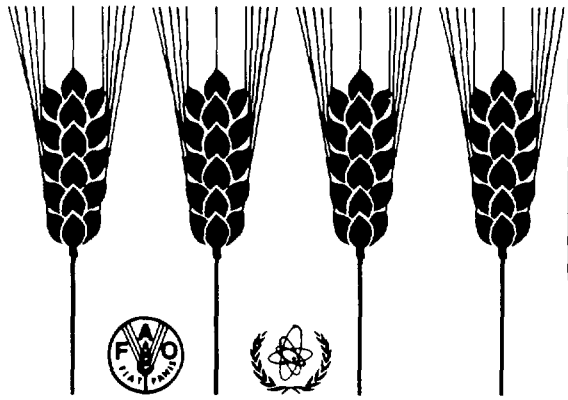

Mutation Breeding Review

JOINT FAO/IAEA DIVISION OF ISOTOPE AND RADIATION APPLICATIONS
OF ATOMIC ENERGY FOR FOOD AND AGRICULTURAL DEVELOPMENT
INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA

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May 1985

PLANT CULTIVARS DERIVED FROM MUTATION INDUCTION OR THE USE OF INDUCED MUTANTS IN CROSS BREEDING.

A. MICKE, M. MALUSZYNSKI, B. DONINI
Joint FAO/IAEA Division
Plant Breeding and Genetics Section
Vienna (Austria)

Since 1969 we have collected information on cultivated varieties of plants, developed by using induced mutations. Whenever we learn about a cultivar presumably derived from an induced mutant or from use of mutants in crosses, we mail a questionnaire to the breeder. The information gathered in this way is stored in our file on "Mutant Varieties". Excerpts are published regularly in the form of a list in the FAO/IAEA Mutation Breeding Newsletter. The information presented in this issue of "Mutation Breeding Reviews" is extracted from the following publications:

SIGURBJÖRNSSON, B. and MICKE, A., Philosophy and Accomplishments of Mutation Breeding. In: Polyploidy and Induced Mutations in Plant Breeding, IAEA Vienna 1974, pp 303-343 (cited in the table as "IAEA, 1974").

FAO/IAEA MUTATION BREEDING NEWSLETTER (A. Micke, Edit.) No. 1 (1972) - 25 (1985) (cited in the table as "MBNL").

Many interesting details about the cultivars listed are scattered in the literature. The authors plan to establish a computerized mutant cultivar file, which would comprise also relevant literature references

about origin, performance and economic value of the cultivars as well as their further use as germ plasm. Reader's assistance in this task would be much appreciated.

Our mutant variety list has repeatedly provided a basis for analyses on the value and prospects of mutation breeding. The most relevant appear to be the following:

BROERTJES, C. and VAN HARTEN A.M. (1978). Application of Mutation Breeding Methods in the Improvement of Vegetatively Propagated Crops. Elsevier Scientific Publishing Company, Amsterdam, Oxford, New York

DONINI, B., KAWAI, T. and MICKE, A. (1984). Spectrum of mutant characters utilized in developing improved cultivars, pp 7-31, In: Selection in Mutation Breeding, International Atomic Energy Agency, Vienna

DONINI, B. and MICKE, A. (1984). Use of induced mutations in improvement of vegetatively propagated crops. In: Induced Mutations for Crop Improvement in Latin America, TECDOC 305, pp 79-98, International Atomic Energy Agency, Vienna.

GOTTSCHALK, W. and WOLFF, G. (1983). Induced Mutations in Plant Breeding. Monographs on Theoretical and Applied Genetics No. 7. Springer Verlag, Berlin.

KONZAK, C.F. (1984). Role of induced mutations. In: Crop Breeding, a contemporary basis (P.B. Vose and S.G. Blixt, Edit.), pp 216-292, Pergamon Press, Oxford

MICKE, A. and DONINI, B. (1982). Use of induced mutations in improvement of seed propagated crops. In: Induced Variability in Plant Breeding. (Proc. of an International Symposium, Wageningen 1981). pp 2-9, Centre for Agricultural Publishing and Documentation, Wageningen.

RUTGER, J.N. (1983). Applications of induced and spontaneous mutation in rice breeding and genetics. Advances in Agronomy 36, 383-410.

SIGURBJÖRNSSON, B. and MICKE, A. (1969). Progress in mutation breeding. In: Induced Mutations in Plants. International Atomic Energy Agency, Vienna, pp. 673-698.

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Name of new variety	Place and date of release (or approval)	Kind and date of mutagenic treatment [treated variety, line, clone...] or mutant crosses (mutant underlined)	Main improved attributes of variety	Reference		
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Abelia sp.						
Mei-Fu-Hana-tsukubane-Utsugi	Japan, 1976	Gamma rays 3 kR rooted young stem cuttings, 1972 [Hanazono-Tsukubane-Utsugi]	More fixed variegated plants of deep green having brighter yellow colour in margins of leaves than other variegated varieties, very dwarf, bright variegated leaves	9	17	
Achimenes sp.						
Compact Arnold	The Netherlands, 1971	X-rays 2-4 kR or fast neutrons 1-2 kR leaves, 1968 [Paul Arnold]	Compact growth habit	2	10	IAEA, 1974
Cupido	The Netherlands, 1973	X-rays 2-4 kR or fast neutrons 1-2 kR leaves, 1968 [Paul Arnold]	Compact, sturdy, freely flowering	17	15	
Early Arnold	The Netherlands, 1971	X-rays 2-4 kR or fast neutrons 1-2 kR leaves, 1968 [Paul Arnold]	1-2 weeks earlier flowering, slightly different flower colour	2	10	IAEA, 1974
Flamingo	The Netherlands, 1977	X-rays 3 kR, leaves 1975, [Tango]	Good growth habit, somewhat more compact, flowers stand out better	17	16	

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Lollipop	The Netherlands, 1977	Fast neutrons 1 kR leaves, 1975 [Tango]	Compact, typical pink flower colour, somewhat fringed	17	16	
Orion	The Netherlands, 1973	X-rays 2-4 kR or fast neutrons 1-2 kR leaves, 1968 [Paul Arnold]	Early flowering; large flower; sturdy but higher plant	17	16	
Pink Attraction	The Netherlands, 1977	X-rays 2.5 kR, leaves 1975, [autotetraploid form of cv. Repel-steeltje]	Compact, regular growth habit with dark green foliage, rather small flower with attractive pink colour	17	16	
Springtime	The Netherlands, 1971	X-rays 2-4 kR or fast neutrons 1-2 kR leaves, 1968 [Paul Arnold]	1-2 weeks earlier flowering slightly different flower colour	2	10	IAEA, 1974
Allium cepa L.						
Brunette	The Netherlands, 1973	X-rays 15 kR, seeds 1960, [Grobol]	Very early, combined with high yield and good quality			IAEA, 1974
Compas	The Netherlands, 1970	X-rays 15 kR, seeds 1960, [Grobol]	Very firm, long-keeping variety, globe type with brownish/yellow skin, three or more dry outer leaves and therefore very suitable for mechanical handling, very uniform	1	7	IAEA, 1974

Alstroemeria sp.

Canaria	The Netherlands, 1970	X-rays, 1967 [Orchid Flower]	Yellow flower colour, original variety white with some yellow			IAEA, 1974
Capitol	The Netherlands, 1977	X-rays, 1972 [Carmen]	Salmon-pink flower colour	17	17	
Fanfare	The Netherlands, 1977	X-rays, 1972 [Carmen]	Red flower colour	17	17	
Harlequin	The Netherlands, 1973	X-rays, 1970 [Paringo's Charm]	Orange-yellow flower colour	17	17	
Harmony stabrons	The Netherlands, 1972	X-rays, 1968 [Regina]	Bronze flower colour	17	16	
Red Sunset	The Netherlands, 1979	X-rays, 1975 actively growing rhizomes	Improved flower colour, extended duration of flowering period	14	12	
Result	The Netherlands, 1977	X-rays, 1972 [Carmen]	Bright red flower colour	17	17	
Rosali staliro	The Netherlands, 1975	X-rays, 1971 [Starosa]	Pink flower colour	17	17	
Rosita stareza	The Netherlands, 1972	X-rays, 1968 [Regina]	Pink flower colour	17	16	
Trident	The Netherlands, 1977	X-rays, 1972 [Carmen]	Pink flower colour	17	17	
Valiant	The Netherlands, 1977	X-rays, 1972 [Carmen]	Light red flower colour	17	17	
White Wings	The Netherlands, 1971	X-rays 300-400 R 1967, plant with stolons [Orchid Flower]	White, except yellow ears	2	9	IAEA, 1974

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Yellow Tiger	The Netherlands, 1970	X-rays, 1967 [Orchid Flower]	Yellow flower colour with striking black stripes, original variety white with some yellow			IAEA, 1974
Zebra stazeb	The Netherlands, 1975	X-rays, 1968 [Orchid Flower]	Heavily striped flower	17	17	
Zenith	The Netherlands, 1977	X-rays, 1972 [Carmen]	Orange-red flower colour	17	17	
Antirrhinum sp.						
Antirrhinum Juliva	FRG, 1961	Cross with X-rays induced mutant [A. divaricata]	Altered flower morphology	7	13	
Bright Butterflies	USA, 1966	Cross with X-rays induced mutant [A. divaricata]	Altered flower morphology	7	14	
Little Darling	USA, 1966	Cross with X-rays induced mutant [A.divaricata]	Altered flower morphology	7	14	
Madame Butterfly	USA, 1966	Cross with X-rays induced mutant [A. divaricata]	Altered flower morphology	7	14	
Arachis hypogaea L.						
Colorado Irradiado	Argentina	X-rays 20 kR, 1964 [Colorado de Cordoba]	Higher yield, higher oil content	7	13	

N.C.4-X	USA, 1959	X-rays, dry seeds 1949, [N.C.4]	Tougher hull - resists damage during harvest and transport, high yield, good quality			IAEA, 1974
Sin Pa detha 1	Burma, 1982	Gamma rays 40 kR, 1977 [Magwe-10, Spanish Type]	10-15 days earlier	20	16	
TG 3	India, 1973	X-rays 15 kR, 1958 [Spanish Improved]	More pods per plant, higher yield, esp. under rainfed conditions	12	14	
TG 4	India, 1976	X-rays 15 kR, 1958 [Spanish Improved] intercross of mutants	Uniform maturity, higher yield esp. in irrigated conditions	12	14	
TG 17	India, 1977	X-rays 15 kR, 1958 [Spanish Improved] intercross of mutants	Higher yield, short plants without secondary branching, higher harvest index	12	14	
Vikram (TG1)	India, 1973	X-rays, 55 kR [Spanish Improved]	Large kernels (TKW 8800 g) particularly suitable for export as "HPS" class, 47-48% oil, maturity 130-135 days, yield potential up to 4 t/ha under irrigated conditions	11	18	IAEA, 1974
Yeu You No. 22	China, 1968	Yu Shi (obtained after beta rays treatment) x Fu Huasheng	Dwarf, higher pod number, higher yield	25	9	
Yeu You 551	China, 1972	Yeu You No. 22 x Yeu You 431	Dwarf, higher pod number, higher yield	25	9	

Name of new variety	Place and date of release (or approval)	Kind and date of mutagenic treatment [treated variety, line, clone...] or mutant crosses (mutant underlined)	Main improved attributes of variety	Reference		
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Arctium lappa L.						
Kobaruto-gokuwase	Japan, 1981	Gamma rays 10 kR seeds, 1969 [Yanagawa-nakate]	Very early maturing, short root, reduced pithiness	21	12	
Kobaruto-okute	Japan, 1981	Gamma rays 10 kR seeds, 1969 [Yanagawa-nakate]	Late maturing, reduced pithiness, good storage quality	21	12	
Kobaruto-wase	Japan, 1981	Gamma rays 10 kR seeds, 1969 [Yanagawa-riso]	Early maturing, rapid root elongation, reduced pithiness	21	12	
Avena sativa L.						
Alamo-X	USA, 1961	X-rays 25 kR, seeds 1953, [Alamo]	Resistant to Victoria blight and crown rust			TAEA, 1974
Bates (C.I. 9211)	USA, 1977	Pettis x *Florida 500*	Two days later than Pettis, 10 cm shorter, less lodging, higher yield, more resistant to BYDV, crown rust and smut.	14	10	
Belozernji	USSR, 1978	MNH, 1966		13	21	
Bob (C.I. 9261)	USA, 1977	Nora x *Florida 501*	Higher yield than either parent, heavier test weight, better crown rust resistance, 5-7 cm shorter, higher protein level, intermediate regarding winter-hardiness and maturity.	14	10	

Florad	USA, 1959	Thermal neutrons seeds, 1954 [Floriland]	Resistant to stem rust, superior grain quality and straw stiffness			IAEA, 1974
Florida 500	USA, 1965	Florad x Coker 58-7	Improved agronomic type combined with rust resistance			IAEA, 1974
Florida 501	USA, 1967	Florad x Coker 58-7	Improved agronomic characters, kernel type combined with crown rust resistance			IAEA, 1974
Nasta	Finland, 1970	Titus x Ryhti	Early as Titus, stiff straw, better yield, high protein and lysine content	20	16	
Puhti	Finland, 1978	Hannes x Ryhti 1964	High yielding ability, stiff straw, good grain quality, moderate earliness	25	9	
Ryhti	Finland, 1970	Jo 50-2395 x Blixt	High yielding ability, stiff straw			IAEA, 1974
Zelenji	USSR, 1976	ENH, 1966	High vegetative production for forage, late ripening	13	21	
Begonia sp.						
Aphrodite Joy	USA, 1974	Gamma rays, 1972 [Aphrodite Rose]	Bright pink ruffled flowers, more vigorous and larger flowers than cv. Aphrodite Pink	17	18	
Aphrodite Peach	USA, 1974	Gamma rays, 1972 [Aphrodite Rose]	Peach coloured flowers, very floriferous, small foliage, short, compact; self-branching, extremely high bud count on leaf cuttings	17	18	

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Aphrodite Twinkles	USA, 1974	Gamma rays, 1972 [Aphrodite Rose]	Dwarf, compact, slow growing, upright, pink flowers	17	18	
Big-Cross	Japan, 1976	Gamma-rays 3 kR adventitious buds of cut leaves, 1971 [Iron Cross]	Larger leaves of unequal heart form having larger cross-shape figures with brighter purple-brown colour than original variety, very strong plants	9	16	
Elegance	USA, 1975	Gamma rays, 1972 [Aphrodite Rose mutant]	Very large double flowers, pink, very ruffled edges, propagates by leaf cuttings, except during summer	17	18	
Enchantress	USA, 1974	Gamma rays, 1972 [Aphrodite Rose]	Ruffled flower, light rose, propagates by leaf cuttings	17	17	
Fantasy	USA, 1975	Gamma rays, 1972 [Aphrodite Rose mutant]	Upright, compact slow growing, leaf propagated, deep rose-red colour	17	17	
Flambeau	USA, 1976	Fast neutrons, 1973 [Aphrodite Red]	Bright red double flower, propagates very well by leaf cuttings	17	19	
Gin-Sei	Japan, 1976	Gamma-rays 10 kR adventitious buds of cut leaves, 1966 [Winter Queen]	More showy leaf colour than original variety, changed from very volute leaves of silver-white colour to smooth leaves of green colour with numerous silver-white spots	9	14	

Heirloom	USA, 1975	Fast neutrons, 1973 [Schwabenland Pink]	Deep bright pink coloured flowers, easier to propagate than parent, little serration on edges of leaves, more resistant to mildew	17	19
Hoblanche	The Netherlands, 1977	X-rays 2.5 kR 1973, [pink sport of cv. Vuurgloed]	White flower colour	17	19
Kaede-Iron	Japan, 1976	Gamma rays 10 kR adventitious buds of cut leaves, 1972 [Iron Cross]	Larger leaves of irregular and pentagonal form having large cross-shape figures with subdued red-brown colour than original variety, very strong plants	9	17
Mikkel Limelight	USA, 1974	Fast neutrons, 1973 [Aphrodite Rose mutant]	Very vigorous grower, large white flowers; propagates by leaf cuttings	17	18
Mini-Mini-Iron	Japan, 1976	Gamma rays 1 kR adventitious buds of cut leaves, 1971 [Iron Cross]	Smaller plants than original variety, change from large size leaves with a cross figure of purplish brown colour to small size leaves with a red-brown stripe, very miniature plants, very pretty and dwarfish plants	9	16
Northern Sunset	Canada, 1975	X-rays [Renaissance]	Increased number of petals per flower	12	17
Orange-Iron	Japan, 1976	Gamma rays 0.5 kR adventitious buds of cut leaves, 1971 [Iron Cross]	More soft-warm colour, changed from large size and yellow coloured leaves of a wry heart form to middle size and orange-green leaves of a symmetrical form, very soft impressionable plants.	9	16

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Red Elegance	USA, 1975	Gamma rays, 1972 [Aphrodite Rose mutant]	Very large double flowers, pink, very ruffled edges, propagates by leaf cuttings, except during summer	17	18	
Rose Elegance	USA, 1975	Gamma rays, 1972 [Aphrodite Rose mutant]	Large rose-red double flowers, ruffled petals, vigorous	17	18	
Ryoku-Ha	Japan, 1976	Gamma rays 10 kR, adventitious buds of cut leaves, 1966 [Winter Queen]	More fine wave-volute leaf figure, changed from very volute leaves of silver white colour to wave-volute leaves of green colour with a small number of silver-white spots, ozone sensitive habit	9	16	
Tiara	The Netherlands, 1974	Radiation, leaves [clone So 1, from F_1 (B. Bertinii compacta "Sonnenschein" x B. socotrana)]	Yellow flowering	7	14	
Turo	The Netherlands, 1973	X-rays 1.5-2.5 kR leaves, [clone Le 1, from F_1 (B. Bertinii compacta "Leuchtfeuer" x B. socotrana)]	Flowers more vivid	7	14	
Bougainvillea sp.						
Arjuna	India, 1976	Gamma rays 500 rad 1970, [Partha]	Variegated leaves	15	14	

Jaya	India, 1977	Gamma rays, chronic 2.5 kR, cuttings [Jayalaxmi]	Ornamental novelty	20	18
Jayalaxmi Variegata	India, 1977	Gamma rays, chronic cuttings [Jayalaxmi]	Ornamental novelty	14 20	12 19
Lady Hudson of Ceylon Variegata	India, 1979	Gamma rays 1 kR and 0,5% colchicine 6 hrs rooted cuttings [Lady Hudson of Ceylon]	Ornamental novelty	20	18
Silver Top	India, 1978	Gamma rays 2.5 kR and 0,5% colchicine 6 hrs rooted cuttings [Versicolour]	Ornamental novelty	20	18
Brassica campestris L.					
Haya-natane	Japan, 1961	Colchicine shoot apex, 1955 [Michinoku-natane]	High yield, very early	21	12
Brassica juncea L.					
RLM 514	India, 1980	Gamma rays 200 kR 1969, [RL 18]	Higher grain yield, 22% over national check variety Varuna, bold grain size, early maturity, high oil content, shattering resistant, 11% less erucic acid	17	13

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Brassica napus L.						
Gan You No. 5	China, 1977	Gamma rays 140 kR [Sheng Li You Cai]	Cold tolerance, disease resistance, higher and stable yield	25	9	
Regina varraps elite A	Sweden, 1953	X-rays 35 kR seeds, 1941 [Svalöf's Regina]	Higher seed yield and oil percent			IAEA, 1974
Regina varraps elite F	Sweden, 1962	X-rays 45 kR seeds, 1945 [Svalöf's Regina]	Higher seed yield and oil percent			IAEA, 1974
Brassica pekinensis (Lour) Rupr.						
Bai Cai No. 9	China, 1978	Gamma rays 80 kR [Kecr/Fei Cheng-Hua Xin]	Early maturity, good storage quality, higher yield	25	10	
Cajanus cajan (L.) Millsp.						
Trombay Vishakha-1	India, 1976	Fast neutrons, 1972 [T-21]	35% increase in seed size with other characters as yield, maturity time, disease reaction equal to original variety	23	16	

Capsicum annuum L.

Albena	Bulgaria, 1976	Gamma rays 13.5 kR dry seeds, 1970 [Zlaten medal]	More attractive fruits, better flavour because of lack of anthozyanine	16	19
Krichimsky ran	Bulgaria, 1972	X-rays, dry seeds, 1965 [Pasardjishka kapia] mutant 794 ms_3 source of male sterility for line 215 ms_3, the female parent for the hybrid variety	Hybrid variety, high yield, early, improved fruit quality	12	16
Ljulin	Bulgaria, 1982	Zlaten medal-ms x line 100	Hybrid variety based on induced male sterility, early harvest	20	16
MDU.1	India, 1976	Gamma rays, 1969-70 [K.1]	Compact plant type, higher yield and capsicine content	10	16

Chrysanthemum sp.

Alankar	India, 1982	Gamma rays 1.5 krad rooted cuttings, 1978 [D-5]	Spanish orange instead of magnolia purple flowers	23	16
Amber Boston	The Netherlands, 1978	[Pink Boston]	Bronze flower colour, better grower than existing sport	16	20
Anamika	India, 1975	Gamma rays 2 krad 1969 [E-13]	Light reddish flower-heads	15	15
Aruna	India, 1974	Gamma rays 1.5 kR 1967 + 1.5 kR, 1968 [Undaunted]	Dark reddish flower-heads	15	14

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Asha	India, 1975	Gamma rays 1.5 kR 1967 [Hope]	Creamish white flower-heads	15	15
Ashankit	India, 1974	Gamma rays 1.5 kR 1967 + 1.5 kR, 1968 [Undaunted]	Semi-quilled and fringed ray-florets	15	14
Basant	India, 1975	Gamma rays 1 kR 1966, [Paul]	Yellow flower-heads	15	15
Basanti	India, 1979	Gamma rays 2 x 1.5 krad suckers, 1976 [E-13]	Yellow instead of mauve flower colour	23	16
Blue Star	The Netherlands, 1977	X-rays 1.75 krad, 1976 [Pink Star]	Darker pink flower colour	16	19
Blue Winner	The Netherlands, 1975	X-rays 1.75 krad, 1973 [Pink Winner]	Flower colour mutant, other characters unchanged	15	16
Bright Lameet	The Netherlands, 1978	X-rays 2.5 krad rooted cuttings, 1976 [Lameet]	Bright yellow flower colour without anthocyanin pigment	14	12
Bright Star	The Netherlands, 1977	X-rays 1.75 krad, 1976 [Pink Star]	Bright pink flower colour	16	19
Bright Westland	The Netherlands, 1976	X-rays 1.75 krad, 1975 [Westland]	Pale pink flower colour	15	17
Bronze Charmette	The Netherlands, 1976	X-rays 1.75 krad, 1975 [Charmette]	Bronze flower colour	15	17
Bronze Clinspy	The Netherlands, 1978	X-rays 1.75 krad rooted cuttings, 1976 [Clinspy]	Bronze flower colour instead of pale pink	14	12

Bronze Miros	The Netherlands, 1979	X-rays 1.75 krad rooted cuttings, 1977 [Miros]	Bronze flower colour rest of genotype unchanged	16	20
Bronze Star	The Netherlands, 1977	X-rays 1.75 krad, 1976 [Pink Star]	Bronze flower colour	16	20
Bronze Westland	The Netherlands, 1976	X-rays 1.75 krad, 1975 [Westland]	Bronze flower colour	15	17
Bronze Winner	The Netherlands, 1975	X-rays 1.75 krad, 1973 [Pink Winner]	Flower colour mutant, other characters unchanged	15	16
Coral Winner	The Netherlands, 1975	X-rays 1.75 krad, 1973 [Pink Winner]	Flower colour mutant, other characters unchanged	15	16
Cream Clingo	The Netherlands, 1979	X-rays, 1.75 krad rooted cuttings, 1977 [Clingo]	Cream flower colour instead of white	14	13
Dalekaya zoezda	USSR, 1976	Gamma rays 0.5 krad rooted cuttings, [Violet colour]	Crimson-violet inflores-cence with silvery reverse	14	13
Danny Boy	The Netherlands, 1973	X-rays 1.75 krad, 1971 [Beamsville Pink]	Yellow flower colour, growth and flower form same as in mother cultivar	15	16
Danny's Cape	The Netherlands, 1973	X-rays 1.75 krad, 1971 [Beamsville Pink]	Yellow flower colour, growth and flower form same as in mother cultivar	15	16
Danny's Pearl	The Netherlands, 1973	X-rays 1.75 krad, 1971 [Beamsville Pink]	Yellow flower colour, growth and flower form same as in mother cultivar	15	16
Dark Charmette	The Netherlands, 1976	X-rays 1.75 krad, 1975 [Charmette]	Dark pink flower colour	15	17

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Dark Deep Tuneful	The Netherlands, 1969	X-rays 1.5 krad, 1967 [Tuneful]	Red flower colour, other characters unchanged	15	16	
Dark Miros	The Netherlands, 1979	X-rays 1.75 krad rooted cuttings, 1977 [Miros]	Darker pink flower colour rest of genotype unchanged	16	20	
Dark Oriette	The Netherlands, 1976	X-rays 1.75 krad, 1975 [Oriette]	Dark pink flower colour	15	17	
Dark Westland	The Netherlands, 1976	X-rays 1.75 krad, 1975 [Westland]	Dark pink flower colour	15	17	
Dr. X	USA, 1966	X-rays 1.2 krad rooted cuttings, 1963 [Dr. Dave]	Darker purple-red flower colour			IAEA, 1974
Gairik	India, 1974	Gamma rays 1 kR 1966 [Belur Math]	Salmon-light flower-heads	15	14	
Gamma	Hungary, 1969	Gamma rays 1.5 krad, 1966 [Obuda]		15	16	
Golden Clingo	The Netherlands, 1979	X-rays 1.75 krad rooted cuttings, 1977 [Clingo]	Dark yellow flower colour instead of white	14	13	
Hemanti	India, 1979	Gamma rays 1.5 krad 1977 [Megami]	Chinese yellow flower-heads	16	21	
Himani	India, 1974	Gamma rays 2 krad 1969 [E-13]	White flower-heads at full bloom stage	15	15	

Improved type of Indianapolis Yellow	The Netherlands, 1970	X-rays 1.5 krad rooted cuttings, 1969 [Indianapolis Yellow]	Improved type, darker yellow, better growth			IAEA, 1974
Izetka Filmstar Bronze	GDR, 1966	X-rays 1-2.5 kR 1958 [Filmstar]	Bronze colour, 6-8 flowers per stem, sturdy, dark-green foliage			IAEA, 1974
Izetka Herbstgold	GDR, 1964	X-rays 1-2.5 kR 1959 [Izetka Kopenicker Rayonnante]	Yellow-bronze, ray-shaped petals, sturdy stem, 20 cm flower diam.			IAEA, 1974
Izetka Kopenicker Barbarossa Goldkissen	GDR, 1962	X-rays 1-2.5 kR 1958 [Barbarossa]	Bordeau-red with bright-yellow centre, windflower-shaped petals, good stem, slightly susceptible to sprays			IAEA, 1974
Izetka Köpenicker Barbarossa Rotstern	GDR, 1962	X-rays 1-2.5 kR 1958 [Barbarossa]	Dull red with yellow centre			IAEA, 1974
Izetka Köpenicker Bronze Vogue	GDR, 1962	X-rays 1-2.5 kR 1956 [Vogue]	Red-bronze colour, in-curved type, 15 cm flower diam.			IAEA, 1974
Izetka Marienhain Cremeweiss	GDR, 1966	X-rays 1-2.5 kR 1957 [Izetka Marienhain]	Cream-white			IAEA, 1974
Izetka Marienhain Dunkelrosa	GDR, 1966	X-rays 1-2.5 kR 1957 [Izetka Marien-hain]	Dark pink, 20 cm flower diam., 6-8 flowers per stem, weather-resistant			IAEA, 1974
Izetka Marienhain Hellgelb	GDR, 1966	X-rays 1-2.5 kR 1957 [Izetka Marien-hain]	Bright-yellow			IAEA, 1974
Jhalar	India, 1975	Gamma rays 1.5 krad 1969 [Undaunted]	Almost flat and fringed ray-florets	15	15	

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Kanak	India, 1975	Gamma rays 1.5 kR 1967 [Undaunted]	Dark brown flower-heads	15	15
Kansya	India, 1974	Gamma rays 1.5 kR 1967 [Rose Day]	Bronze flower-heads	15	14
Kapish	India, 1974	Gamma rays 2 krad 1969 [E-13]	Brown flower-heads	15	15
Kraski oseni	USSR, 1976	Gamma rays 0.5 krad rooted cuttings [Violet colour]	Dull pink-crimson with bronze center	14	13
Kunchita	India, 1974	Gamma rays 1.5 krad 1969 [Undaunted]	Incurved flower-heads	15	14
Lohita	India, 1974	Gamma rays 2 krad 1969 [E-13]	Dark reddish flower-heads	15	15
Man Bhawan	India, 1982	Gamma rays 1.5 krad rooted cuttings, 1978 [Flirt]	Bicoloured red and yellow instead of red flowers	23	16
Mars	USSR, 1976	Gamma rays 0.5-1 krad, rooted cuttings [Privet zime]	Orange inflorescence	14	15
Merkurii	USSR, 1976	Gamma rays 0.5-1 krad rooted cuttings [Privet zime]	Lilac-violet inflorescence	14	15
Middelry	The Netherlands, 1976	X-rays 1.5 krad, 1975 [Pinkish sport of Horim]	Bright yellow flower colour	15	16

Mikrop	The Netherlands, 1976	X-rays 1.5 krad, 1975 [Pinkish sport of Horim]	Pink flower colour	15	16
Milava	The Netherlands, 1976	X-rays 1.5 krad, 1975 [Pinkish sport of Horim]	Creamy yellow flower colour	15	16
Milonka	The Netherlands, 1976	X-rays 1.5 krad, 1975 [Pinkish sport of Horim]	White flower colour	15	16
Miros	The Netherlands, 1978	X-rays 1.75 krad rooted cuttings, 1976 [Mikrop]	Darker pink flower colour 10 cm longer crop in winter	16	20
Mirazh	USSR, 1976	Gamma rays 0.5 krad rooted cuttings [Lilac-pink]	Spidery inflorescence with tubular flowers, light lilac	14	14
Mlechnyi put	USSR, 1976	Gamma rays 0.5-1 krad rooted cuttings [Privet zime]	White inflorescence	14	15
Morning Sun	The Netherlands, 1978	X-rays 1.75 kR rooted cuttings, 1976 [Evening sun]	Pure yellow flower colour	16	19
Nirbhaya	India, 1975	Gamma rays 1.5 kR 1967 [Undaunted]	Lighter mauve, semi-quilled and fringed ray-florets	15	15
Nirbhik	India, 1975	Gamma rays 1 krad 1970 [Undaunted]	Lighter mauve, almost flat and fringed ray-florets	15	15
Orange Miros	The Netherlands, 1979	X-rays 1.75 krad rooted cuttings, 1977 [Miros]	Orange flower colour	16	20
Orion	USSR, 1976	Gamma rays 0.6 krad rooted cuttings [Charodeika]	White inflorescence with lilac streaks	14	14

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Pingal	India, 1974	Gamma rays 1 krad 1971 [Pink Casket]	Terracotta flower-heads with larger number of spoon-type ray-florets	15	14
Pink Clinspy	The Netherlands, 1978	X-rays 1.75 krad rooted cuttings, 1976 [Clinspy]	Pink flower colour instead of pale pink	14	12
Pitaka	India, 1978	Gamma rays [Kansya]	Yellow flower colour	14	13
Pitambar	India, 1978	Gamma rays [Otome-Zakura]	Yellow flower colour	14	13
Plutonii	USSR, 1976	Gamma rays 0.5-1 krad rooted cuttings [Privet zime]	Pale pink inflorescence	14	15
Privet Frantsii	USSR, 1976	Gamma rays 0.5 krad rooted cuttings [Excellence]	Dull red inflorescence with cherry tinge, bronze reverse	14	14
Purnima	India, 1978	Gamma rays [Otome-Zakura]	White flower colour	14	13
Radii	USSR, 1976	Gamma rays 0.75 krad rooted cuttings [Springdawn at Suti dam]	Pale yellow inflorescence with rose tubes	14	14
Rohit	India, 1979	Gamma rays 2 krad 1977 [Kingsford Smith]	Rhodonite red flower heads	16	20

Saturn	USSR, 1976	Gamma rays 0.6 krad rooted cuttings [Charodeika]	Dark crimson inflorenscence with bronze casts, flowers ligulate and long-bladed	14	14
Selena	USSR, 1976	Gamma rays 1.75 krad rooted cuttings [Springdawn at Suti dam]	Yellow inflorescence	14	14
Shafali	India, 1975	Gamma rays 1.5 kR 1967 + 1.5 kR, 1968 [Undaunted]	Light reddish, incurving to incurved flower-heads	15	15
Shukla	India, 1974	Gamma rays 1.5 kR 1968 [Mrs. H. Gubby]	White flower-heads	15	14
Shveta	India, 1974	Gamma rays 2 krad 1969 [Fish Tail]	Almost white flower-heads at full bloom stage	15	14
Sointse	USSR, 1976	Gamma rays 0.7 krad rooted cuttings [Modnitsa]	Yellow inflorescence	14	14
Sputnik	USSR, 1976	Gamma rays 0.6 krad rooted cuttings [Charodeika]	White inflorescence with cream center	14	14
Svarnim	India, 1975	Gamma rays 1.5 krad 1968 [Undaunted]	Light brown flower-heads	15	15
Tamra	India, 1974	Gamma rays 1.5 krad 1970 [Goldie]	Ray-florets having more intense coppery red (Apricot) colour on yellow background	15	15
Taruni	India, 1979	Gamma rays 2 krad 1977 [Kingsford Smith]	Azalea pink flower-heads	17	19
Tsezii	USSR, 1976	Gamma rays 0.6 krad rooted cuttings [Charodeika]	Dull crimson inflorescence with gray tubes	14	14

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Uncle Danny	The Netherlands, 1973	X-rays 1.75 krad, 1971 [Beamsville Pink]	Yellow flower colour; growth and flower form same as in mother cultivar	15	16
White Clinspy	The Netherlands, 1978	X-rays 1.75 krad rooted cuttings, 1976 [Clinspy]	White flower colour instead of pale pink	14	12
White Danusia	The Netherlands, 1977	X-rays 1.75 kR rooted cuttings, 1975 [Danusia]	White flower colour	14	13
White Westland	The Netherlands, 1978	X-rays 1.75 krad, 1975 [Westland]	White flower colour	16	21
White Winner	The Netherlands, 1975	X-rays 1.75 krad, 1973 [Pink Winner]	White flower colour, other characters unchanged	15	16
Yalta	USSR, 1976	Gamma rays 0.5 krad rooted cuttings [Violet colour]	Dark salmon inflorescence with golden reverse, tortoise shell	14	13
Yellow Clingo	The Netherlands, 1979	X-rays 1.75 krad rooted cuttings, 1977 [Clingo]	Yellow flower colour instead of white	14	13
Yellow Clinspy	The Netherlands, 1978	X-rays 1.75 krad rooted cuttings, 1976 [Clinspy]	Yellow flower colour instead of pale pink	14	12
Yellow Danusia	The Netherlands, 1977	X-rays 1.75 kR rooted cuttings, 1975 [Danusia]	Dark pink flower colour	14	13

Yellow Westland	The Netherlands, 1978	X-rays 1.75 krad, 1975 [Westland]	Yellow flower colour	16	21	
Yellow Winner	The Netherlands, 1975	X-rays 1.75 krad, 1973 [Pink Winner]	Flower colour, other characters unchanged	15	16	
Yupiter	USSR, 1976	Gamma rays 0.5-1 krad rooted cuttings [Privet zime]	Cream-yellow inflorescence	14	15	
Cicer arietinum L.						
CM 72	Pakistan, 1983	Gamma rays 15 krad 1974 [6153]	Resistant against chickpea blight - *Ascochyta rabiei*, high yield	23	17	
Hyprosola	Bangladesh, 1981	Gamma rays 20 kR 1971 [Faridpur-1]	Matures 10 days earlier, more pods, higher harvest index, higher planting density feasible, ca. 19% higher yield than parent variety, 4% more protein	19	14	
Citrus sp.						
Star Ruby	USA, 1970	Thermal neutrons 1959 [Hudson]	Red flesh like parent variety, but almost seedless (0-9 seeds instead of 40-60)			IAEA, 1974
Corchorus capsularis L.						
JRC-7447	India, 1980	X-rays 25 kR [JRC 212]	10% more yield with 60 kg N/ha recommended for capsularis jute belt except low lying areas	18	19	

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Corchorus olitorius L.					
Atompat-28 (C-28)	Bangladesh, 1974	Gamma rays, seeds 1964, [D-154]	Higher yield	12	16
Atompat-36 (C-36)	Bangladesh, 1974	Gamma rays, seeds 1964, [D-154]	Higher fibre yield slightly later maturity, more resistant to stem rot (*Macrophomina phaseoli*)	12	16
Atompat-38 (C-38)	Bangladesh, 1974	Gamma rays, seeds 1964, [D-154]	Vigorous, more leafy higher yield	12	16
Mahadev TJ.40	India, 1983	Thermal neutrons 1968, /*virescent* x *involute leathery*/ mutants from [JRO 632]	High fibre yield	23	17
Shwe Gon Tun	Burma, 1975	Selection from mutant *C-28* developed in Bangladesh	Early maturing, high yield	12	16
Cynodon sp.					
Tifway II	USA, 1981	Gamma rays 9 krad dormant rhizomes, 1970 [Tifway]	Better nematode resistance, more frost, better spring growth, denser and more weed-free turf	19	14

Cyperus malaccensis Lam.

Toyomidori	Japan, 1979	Gamma rays 115 kR growing plants, 1969 [Ohi 2]	Thick stem, lodging resistance, resistance to downy mildew, high yield	21	13	

Dahlia sp.

Adagio	France, 1970	Gamma rays 2-3 krad dormant tubers 1965, [Aztec]	Orange flower	17	19	
Allegro	France, 1970	Gamma rays 2-3 krad dormant tubers 1965, [Aztec]	Light purple flower	17	19	
Altamira	France, 1970	Gamma rays 2-3 krad dormant tubers 1965, [Aztec]	Orange and red stripes (chimera)	17	19	
Amalfi	France, 1970	Gamma rays 2-3 krad dormant tubers 1965, [Aztec]	Light and bright red flower	17	20	
Annibal	France, 1970	Gamma rays 2-3 krad dormant tubers 1965, [Aztec]	Dark purple flower	17	20	
Autumn Harmony	The Netherlands, 1967	X-rays 1-4 krad, 1963 [Arthur Godfrey]	Cadmium-orange with scarlet centre			IAEA, 1974
Bichitra	India, 1978	Gamma rays 2-3 krad tubers, 1972-73 [Kenya]	Plant 75 cm tall, stem light green colour, leaf lighter shade, flower mimosa-yellow, reddish tinge develops with age, petals narrow and arrangement compact	14	15	

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Black Beauty	India, 1978	[Black Out]	Plant 47 cm, bloom darkest crimson colour with neyron rose stripes, size of bloom like that of parent, very attractive	14	16	
Dutch Visit	The Netherlands, 1968	X-rays 2 krad dormant tubers, 1963 [Arthur Godfrey]	Orange-red flower colour, bloom 30 cm diam., rest of genotype unchanged			IAEA, 1974
Explosion	The Netherlands, 1967	X-rays 1-4 krad, 1963 [Arthur Godfrey]	Blood-red with bright yellow centre, massive bloom, full at centre with very fine habit			IAEA, 1974
Governor	The Netherlands, 1968	X-rays 2 krad dormant tubers, 1964 [Authority]	Bloom 18 cm diam., plant 150 cm tall, deep copper-red flower colour			IAEA, 1974
Gracieuse	The Netherlands, 1966	X-rays 1-4 krad, Dormant tubers, 1963 [Salmon Rays]	Violet-mauve coloured spider-cactus type			IAEA, 1974
Happiness	India, 1978	[Croydon Monarch]	Plant 40 cm tall, bloom same size as that of parent deep ruby red colour	14	16	
Holland Jubilee	The Netherlands, 1967	X-rays 1-4 krad, 1963 [Arthur Godfrey]	Light-orange throughout, blooms more firm and regular than original cultivar			IAEA, 1974
Jayaprakash	India, 1978	[Croydon Apricot]	Plant 45 cm tall, bloom 25 cm, phlox pink in colour, compact form and attractive	14	16	

Jubilee	India, 1978	Gamma rays 2-3 krad tubers, 1972-73 [Kenya]	Plant 75 cm tall, bloom 35 cm diam., orange-yellow flower colour with occasional pink stripes	14	16	
Jyoti	India, 1978	Gamma rays 2-3 krad tubers, 1972-73 [Kenya]	Plant 83 cm tall, mallow purple flowers of good form and habit	14	15	
Maarse's Golden Wonder	The Netherlands, 1972	X-rays 1-2 krad dormant tubers, 1968 [Andries Wonder]	Dark yellow flower colour			IAEA, 1974
Maarse's Purple Wonder	The Netherlands, 1972	X-rays 1-2 krad dormant tubers, 1968 [Andries Wonder]	Purple flower colour			IAEA, 1974
Maarse's Red Brown Wonder	The Netherlands, 1972	X-rays 1-2 krad dormant tubers, 1968 [Andries Wonder]	Red brown flower colour			IAEA, 1974
Motive	The Netherlands, 1971	X-rays 2 krad dormant tubers, 1963 [Arthur Godfrey]	Purple flower colour	2	10	IAEA, 1974
Netaji	India, 1978	[Eagle Stone]	Plant 50 cm tall, colour of bloom light primrose yellow, attractive bloom	14	16	
Ornamental Rays	The Netherlands, 1966	X-rays 1-4 krad dormant tubers, 1963 [Salmon Rays]	Apricot coloured mutant with larger blooms than parent			IAEA, 1974
Pearl	India, 1978	[Eagle Stone]	Plant 50 cm tall, bloom 15 cm diam., bloom pearl white colour	14	16	

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Pride of Sindri	India, 1978	Gamma rays 2-3 krad tubers, 1972-73 [Kenya]	Plant 82 cm tall, stem light green colour devoid of pink pigmentation as that of parent, leaf lighter shade than parent, flower primrose yellow colour, more compact than parent, 35 cm diam., flowers more freely	14	15	
Progression	The Netherlands, 1967	X-rays 1-4 krad, 1963 [Arthur Godfrey]	Brick-red throughout			IAEA, 1974
Raymond Smith	The Netherlands, 1970	X-rays 2 krad dormant tubers, 1965 [El Dorado]	Semi-cactus, light orange with large white tops			IAEA, 1974
Rosy Mist	The Netherlands, 1967	X-rays 1-4 krad, 1963 [Arthur Godfrey]	Empire-rose throughout			IAEA, 1974
Rotonde	The Netherlands, 1966	X-rays 1-4 krad dormant tubers, 1963 [Salmon Rays]	Vivid colour, true-pink flowering mutant with larger blooms than parent			IAEA, 1974
Selection	The Netherlands, 1966	X-rays 1-4 krad dormant tubers, 1963 [Salmon Rays]	Larger blooms and longer stems than parent, but with same flower colour			IAEA, 1974
Temptation	The Netherlands, 1968	X-rays 2 krad dormant tubers, 1963 [Arthur Godfrey]	Dark lacquer-red colour, giant flower			IAEA, 1974
Twilight	India, 1978	Gamma rays 2-3 krad tubers, 1972-73 [Kenya]	Plant 80 cm tall, bloom 35 cm diam., a purplish red flowering mutant	14	16	

Vivekananda	India, 1978	[Croydon Master]	Plant 1.2 m tall, bloom 28 cm diam., spirea red colour, ray florets are divided at the tips	14	16	
Wine Herald	The Netherlands, 1969	X-rays 2 krad dormant tubers, 1967 [Holland Herald]	Improved flower colour			IAEA, 1974
Dianthus caryophyllus L.						
Enzett Barther Frühling	GDR, 1974	EMS 2.5%, 1967 [Arthur Sim]	Instead of white flowers with red stripes the new variety has pink flowers with red stripes and white spots 1980: 9.1% of carnation area in GDR	23	17	
Enzett Folklore	GDR, 1974	EMS 2.5%, 1967 [William Sim]	More pronounced red flower colour, long, stiff stems, less branching, petals more indented 7.4% more yield 1980: 9.1% of carnation area in GDR	23	17	
Dione	GDR, 1977	EMS 2.5%, 1967 [William Sim]	Pink instead of red flower colour, otherwise similar to William Sim 1980: 7.3% of carnation area in GDR	23	17	
Sim Feu Follet	France, 1972	Gamma rays, 5 kR 1965 [Sim Jacqueline]	Large yellow flower with broad red stripes	2	9	
UConn White Sim No. 1	USA, 1962	Gamma rays rooted cuttings [White Sim]	Fewer ray flowers, holds longer after cutting			IAEA, 1974

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Eriobotrya japonica Lindl.					
Shiro-mogi	Japan, 1981	Gamma rays 20 kR seeds, [Mogi]	Large fruit size, good taste	21	13
Euphorbia fulgens Karw.					
Albora	The Netherlands, 1976	X-rays 4 krad rooted cuttings, 1973	Bright orange flower colour	15	17
Ficus carica L.					
Bol (Abundant)	USSR, 1979	Gamma rays 5-7 krad seeds		18	19
Forsythia x intermedia					
Courtalyn	France, 1984	Gamma rays 7 kR, 1970 [Linwood]	More erect form with dwarf internode, blooming on one year old shoot	25	10
Courtadic	France, 1984	Gamma rays 7 kR, 1970 [Vitellina]	Great number of slender ramifications and dense blooming, possible use as ground cover	25	10

Glycine max L.

Boriana	Bulgaria, 1981	Gamma rays 10 krad followed by 0.1% EMS 4h, seeds 12% moisture 1976, [Beeson]	Maturing in 105-110 days, 30 days earlier than Beeson, protein content 5% higher, yield 6% higher than Beeson	23	18
Cerag Nr. 1	Algeria, 1979	Gamma rays 30 kR, 1972 mutant selected in Romania, [B 107/10]	Early, resistant against spring cold, very productive, drought resistant, short plant type, white flowers, yellow seeds	14	11
Hei Noun No. 4	China, 1967	Gamma rays 10 kR [Man Cang Jin]	Compact branched type	25	10
Hei Noun No. 5	China, 1967	Gamma rays 10 kR [Dong Noun No. 4]	Good root system, short internode	25	10
Hei Noun No. 7	China, 1967	Gamma rays 10 kR [Dong Noun No. 4]	Higher branch and pod number	25	10
Hei Noun No. 8	China, 1967	Gamma rays 10 kR [Dong Noun No. 4]	10 days earlier than original variety, humidity tolerance	25	10
Hei Noun No. 16	China, 1970	Gamma rays 10 kR [F_2(Wu Ding Zhu x Jing Shan Pu)]	Higher branch number, short internode, drought tolerance, wide adaptability	25	11
Hei Noun No. 26	China, 1976	Ha 2294 x Xiao Jinhuang No. 1	Good stature, cold, drought and waterlogging tolerance, good quality	25	11
KEX-2	Korea, 1973	X-rays 24 kR, 1963 [Kumkang-Dai-Rip]	11 days earlier maturity, ca. 16% higher yield, large seed size	4 11	14 17

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Mu Shi No. 6	China, 1980	Gamma rays 12 kR [Feng Shou No. 10 x Ji Lin No. 3]		25	11	
Nanbushirome	Japan, 1977	Raiden x Kitami-nagaha	Changed towards intermediate maturing time, long leaf, high yield, resistant to cyst nematode	21	13	
Raiden	Japan, 1966	Gamma rays 10 krad dry seeds, 1960 [Nemashirazu]	Earlier maturity, shorter stem, resists lodging, maintains high yield and nematode resistance of original variety			IAEA, 1974
Raiko	Japan, 1969	Gamma rays 10 krad dry seeds, 1960 [Nemashirazu]	Earlier maturity, shorter stem, resists lodging, higher yield, maintains nematode resistance of original variety			IAEA, 1974
Tai Nung No. 1(R)	China, 1962	Thermal neutrons	Vigorous, dropping-resistant variety with long branches and higher yield			IAEA, 1974
Tai Nung No. 2(R)	China, 1962	X-rays	Vigorous, dropping-resistant variety with short internode, large seed, and adapted to acid or alkaline soil			IAEA, 1974
Tie Feng 18	China, 1973	Gamma rays 12 kR [45-15/5621]	Fertility tolerance, lodging resistance, higher yield, good quality	25	11	

* Universal I	USSR, 1965	Gamma rays [Imeretinskaya]	Surpasses initial variety by 50 kg/ha in grain yield, is lodging resistant, can be used as grain crop and as green fodder	19	14	
Gossypium sp.						
Lu Mian No. 1	China, 1976	Gamma rays 40-45 kR 1971, [F_9 (Zhong No. 2 x 1195)]	Good vigor and plant architecture, higher boll production, 1981 cultivated on 1,238,000 ha	19	15	
MCU 7	India, 1971	X-rays 40, 60 and 80 krad, 1965 [L1143EE]	Earlier maturity 10-15 days, higher yield, increased spinning capacity	2	9	IAEA, 1974
NIAB-78	Pakistan, 1983	Gamma rays 30 kR [F_1 (Deltapine x Ac134)]	High yield, early maturity, medium stature with 0-2 monopodial	23	18	
Pusa Ageti	India, 1978	Gamma rays 25 kR 1969, [Stoneville 213]	High ginning GP 38, short duration 150 days, jassid tolerant fits well for cotton/wheat rotation in Northern India	16	19	
Rasmi	India, 1976	Gamma rays 30 kR 1969 [MCU 5]	Daylength tolerant therefore suitable for cultivation throughout India during main Kharif season and also off-season, high yield, superior quality	16	18	
Guzmania paecockii Ruiz et Pav.						
Edith	Belgium, 1974	Gamma rays 3.3 krad seeds, 1964	Striped leaves	17	20	

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Helianthus annuus L.					
Pervenets	USSR, 1977	DMS, 1965	High oil content, altered fatty acid composition	13	20
Hibiscus sp.					
Hiroshima local No.1	Japan, 1967	Gamma rays 0.5 kR, 1956 [Hiroshima local]	Increased plant height, resistance to Phytophthora parasitica	12	17
Hiroshima local No.3	Japan, 1967	Gamma rays 0.5 kR, 1956 [Hiroshima local]	Increased plant height, resistance to Phytophthora parasitica	12	17
Hiroshima local No.5	Japan, 1967	Gamma rays 0.5 kR, 1956 [Hiroshima local]	Increased plant height, resistance to Phytophthora parasitica	12	17
Hiroshima local No. 7	Japan, 1967	Gamma rays 0.5 kR, 1956 [Hiroshima local]	Increased plant height, resistance to Phytophthora parasitica	12	17
Hordeum vulgare L.					
Ai Zao No. 3	China, 1977	Gamma rays 22 kR	Early maturity, short straw, lodging resistance, higher yield	25	11

Alf	Denmark, 1978	Thermal neutrons 300 rad, 1969 [Bomi]	Short and stiff straw	13	18	
Allasch	FRG, 1963	(Haisa I x /Imperial x H 204/) x Svalöf erectoides 12, X-ray mutant of Maja	Straw stiffness (withdrawn from the market in 1971 because of breakdown of mildew resistance)	5	13	
Amagi Nijo 1	Japan, 1971	X-rays, 20 krad air-dry seeds, 1965 [Fuji Nijo]	Earlier maturity (2-5 days), shorter culm (10-15 cm)	2	8	IAEA, 1974
Amei	FRG, 1966	(Haisa I x /Imperial x H 204/) x Svalöf erectoides 12, X-ray mutant of Maja	Straw stiffness (withdrawn from the market in 1967 because of breakdown of mildew resistance)	5	13	
Ametyst /HE 464b/	CSSR, 1972	(Voldagsen x //Domen x /Valticky x Hanacky jubiel./) x Diamant	Growing type like Diamant, better grain production, stiff straw, mildew resistant (gene Mla 6), high weight of 1,000 grains, medium malting quality	10	17	
Atlanta	Canada, 1977	(Anoidium/Montcalm 3/2/Herta/Br M57/754/3) x Hellas	Lodging resistant superior yield	11	17	
Atlas	CSSR, 1976	S55 (Stupice line) x Diamant	Growing type like Diamant. Good tillering, resistant to lodging, mildew resistant (Mla 7) good yield and grain weight.	10	14	
Balder J.	Finland, 1960	X-rays 6 kR soaked seeds, 1946 [Balder]	High yielding ability, resistance to drought and ear sprouting, low growth requirements	5	14	IAEA, 1974

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Berta	Austria, 1982	Trumpf x Medina	High yield, lodging resistance	20	17	
Betina	France, 1970	EMS, seeds [Vada]	Short, stiff straw and excellent mildew tolerance, high yield			IAEA, 1974
Blazer	USA, 1974	Traill x WA1038-WA6704-62 (induced recombinant, thermal neutrons, 1962)	6-row spring malting barley with increased alpha amylase, due to linkage broken by irradiation. Improved shatter resistance, straw strength and yield (in 1976, 60,000 acres in Wash. and Idaho).	10	18	
Bonneville 70	USA, 1969	Thermal neutrons seeds, 1952 [Bonneville]	Improved threshability (brittle awn)			IAEA, 1974
Boyer	USA, 1974	Luther x WA Sel. 1255-60	6 row winter feed barley, earlier maturing, higher yielding, more winter hardy, larger grain than Luther. Maintained from mutant high yield, straw strength, short straw.	10	18	
Deawn	USA, 1975	Cross with Bonneville 70	Shorter culm and earlier ripening than Bonneville	11	17	
Debut	USSR	NEM 0.05%	High yield, resistant to stress	20	17	

Denar	CSSR, 1969	X-rays [F_1 (Celechovicky x Bavaria)]		6	13	
Diabas	CSSR, 1977	Cross with Diamant		13	19	
Diamant	CSSR, 1965	X-rays 10 krad seeds 14% moisture 1956, [Valticky]	Very high yield, short stem, very good grain and malting quality, lodging resistant			IAEA, 1974
DL-253	India, 1981	Gamma rays 20 kR + 0.30% EMS (sequential treatment) seeds, [Ratna]	Higher tiller number, higher yield, field resistance to covered and loose smut and to yellow rust	19	15	
Eva	Sweden, 1972	Mari x Birgitta	Straw stiff, early maturing in northern Sweden, high seed production and large kernels	7	12	
Fakel	USSR, 1975	EI 0.04%, seeds, 1966 [Moskovskii 121]	15-18% shorter straw, lodging resistant, higher protein content	12	14	
Favorit /HE 481/	CSSR, 1973	Diamant x Firl. Union	Growing type like Diamant, better grain production, short straw. Lodging, straw breaking, mildew (Mlg), H. teres and R. secalis resistant, very good malting quality	10	18	
Fuji 2-jyo II	Japan, 1974	5-bromodeoxyuridine (1mM, 1 hr) + gamma rays 1 kR, seeds presoaked 15 hrs. [Fuji 2-jyo]	Resistant to lodging by stiff straw	11	17	

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Gamma No. 4	Japan, 1965	Gamma rays 15 kR seeds, 1958 [Kirin-Choku 1]	Short-stem, early maturity			IAEA, 1974
Goldmarker	UK, 1976	Midas x TCE 141	Erectoid growth habit from mutant parent of Midas. Excellent head retention under unfavourable climatic conditions.	10	15	
Goldspear	UK, 1975	Midas x Lofa Abed	Erectoid growth habit from mutant parent of Midas, strong straw. Excellent head retention under unfavourable climatic conditions	10	15	
Gunilla	Sweden, 1970	(Birgitta x /Opal x Vega/) x "blue, lodging resistant mutant 44/3 from Gull"	High yield, good straw (especially adapted for northern Sweden)			IAEA, 1974
Hana /HE 498/	CSSR, 1973	Alsa x Diamant	Growing type like Diamant, better grain production, shorter stem, resistant to lodging, very good malting quality	10	17	
Hankkija's Aapo (Hja 4003)	Finland, 1975	X-rays, 1961 [Ta 7990 (a 4615 x Staller II)]	Two row fodder barley, very stiff, short straw, high tillering capacity, high yielding ability	7	13	

Hankkija's Eero (Hja 4715)	Finland, 1975	Mari x Otra (six rowed)	Six row fodder barley, very stiff, also in northern latitudes, short straw	7	13	
Haya-Shinriki	Japan, 1962	Gamma rays 40 kR air-dry seeds, 1957 [Aka-Shinriki]	Earliness, good quality	2	8	IAEA, 1974
Hellas	Sweden, 1967	Pallas x Herta	Resistant to lodging and straw breakage, increased yield especially with heavy fertilization, resists sprouting at harvest time			IAEA, 1974
Jenny	Sweden, 1980	Kristina x (Hellas x /Pallas x Rupee/)	Yield, mildew resistance	19	15	
Jupiter	UK, 1976	Betina x Midas	Highest yielding recommended variety in UK, 18% above "Julia"	13	18	
Jutta	GDR, 1955	X-rays 5 kR, 1944 [Peragis mittelfrühe II]	Higher yield, lodging resistance, increased winter hardiness			IAEA, 1974
Kawamizuki	Japan, 1979	Ukei H-83 x Ukei H-79 gamma ray induced mutants	Short and stiff culm, early, high and stable yield	21	13	
Keti	Denmark, 1982	Rupal x (Ingrid x Proctor)	Two row feed barley, mildew resistant, high yield	20	17	
Kristina	Sweden, 1969	Domen x Mari	Resistant to lodging and straw breakage, very high yield, outstanding malting quality			IAEA, 1974
Kustaa (Sv 71297)	Finland, 1980	(/Mari x Monte Christo/ x Impala) x Kristina	Earliness	19	15	

Name of new variety	Place and date of release (or approval)	Kind and date of mutagenic treatment [treated variety, line, clone...] or mutant crosses (mutant underlined)	Main improved attributes of variety	Reference		
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Lina	Sweden, 1982	Lofa x (A6564 x/Mari backcrossed x Multan/)	Higher yield, lodging resistance.	25	11	
Luther	USA, 1967	dES (3.8 mM), 3 1/2 hr 30°C, seeds, 1960 [Alpine]	Shorter straw, increased grain yield and lodging resistance, especially with heavy fertilization			IAEA, 1974
Mari	Sweden, 1962	X-rays 20 krad dry seeds, 1949 [Bonus]	Early maturity (by 8 days), stiffer straw			IAEA, 1974
Markeli 5	Bulgaria, 1976	Gamma rays 40 kR, 1967 [Beta ketsoras]	6-8 days earlier heading, higher productivity, large and uniform sized grain, better brewing properties	14	10	
Midas	UK, 1970	RM.759/10 x Milns Golden Promise	Short, stiff straw, erectoides habit, mildew resistant			IAEA, 1974
Milns Golden Promise	UK, 1966	Gamma rays 1956 [Maythorpe]	Shorter and stiffer straw, good grain, yield and malting properties, but mildew-susceptible			IAEA, 1974
Minak	UK, 1976	(Betina x Midas) x Maris Yak	Very stiff straw, feed barley, yield 12% above "Julia"	13	18	
Minsk	USSR, 1974	Gamma rays [Viner]	Improved lodging resistance and yield, good milling and brewing qualities	6	13	

Mona	Sweden, 1970	Mari (3 back-crosses) x Monte Cristo	High yield (7% higher than parent variety), good straw, mildew resistant			IAEA, 1974
Nadja	GDR, 1975	Diamant x several sources of disease resistance	Short stem, lodging resistance, mildew, stripe rust, leaf rust resistance. Superior to Diamant in yield 1975: 52,000 ha cultivated	9	15	
Nirasaki Nijo 8 (previous Gamma No.8)	Japan, 1967	Gamma No.4 x 34r127 (early mutant from Kirin Choku No.1) cross 1962	Early maturity (4-5 days), shorter culm	2	8	IAEA, 1974
Novator	USSR	Mutant cross	High yield, winter resistant, high protein	20	17	
Pallas	Sweden, 1960	X-rays 7350 r presoaked seeds, 1946 [Bonus]	Stiff straw			IAEA, 1974
Pennrad	USA, 1963	Thermal neutrons 1956 [Hudson]	Increased winter hardiness awned, recessive gene mutant			IAEA, 1974
Pernilla	Sweden, 1979	((Birgitta x Mari) x (/Opal x Vega/ x Bladaggig ur Gull)) x Birgitta	Earliness, yield	19	15	
Prisiv	USSR	Mutant cross	High yield, winter resistant, high protein	20	17	
Radiation	Korea, 1974	Thermal neutrons, 1967 [Bangju]	Naked barley with earlier maturity, short culm, resistance to lodging, increased fertilizer response and stable high yield	5	13	

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Rapid	CSSR, 1976	(/Voldagsen x Kneifl/ x Diamant) x Denar	Growing type like Diamant. Higher grain production, resistant to mildew (genes Mla 6 and Mlg), early maturing.	9	14	
RDB-1	India, 1972	Pile neutrons 4.5×10^{12} NP/cm^2 1960, [R.S.-17]	Dwarf, early, high grain yielding capacity, non-lodging, less water requirements	2	8	IAEA, 1974
Rupal	Sweden, 1972	Pallas x Rupee	Short straw, mildew resistant, sprouting resistant	7	12	
Safir	CSSR, 1978	(/Valticky x Kneifel/ x Diamant) x Arabische G	Shorter straw, altered vegetation rhythm, good tolerance to drought, high yield, top malting quality, (1979, 45,000 ha, 15% of barley acreage)	14	11	
Salve	Sweden, 1974	Mari x Birgitta	Large, plump kernels, stiff straw and high seed production, good field tolerance to mildew	7	12	
Senat	Sweden, 1974	Pallas x Hellas x "triple-awn lemma"	Straw stiff, sprouting resistant	7	12	
Spartan	CSSR, 1977	Diamant x (/Valticky x Monte Christo/ x Ekonom)	Shorter straw, altered vegetation rhythm, high yield, top malting quality (1979, 250,000 ha, 35% of barley acreage.	14	11	

Stange	Norway, 1978	Ingrid x Mari	Short culm, superior yield	12	14	
Temp	USSR, 1976	ENH, 1966 [Krasnodarskij 35]	Feeding barley, high yield 2-3 days earlier heading, mildew resistant	13	18	
Troja	Sweden, 1981	A61657 x (Mari^5 x triple awn lemma)	High yield, lodging resistance	25	11	
Trumpf	GDR, 1973	Diamant x several sources of disease resistance	Short stem, lodging resistance, mildew, stripe rust, leaf rust resistance. Superior to Diamant in yield 1975: 334,000 ha cultivated	9	14	
Vienna	Austria, 1959	X-rays 9.4 kR dry seeds, 1951 [Probstdorfer Vollkorn VK 41]	High yield, high 1000-kernel weight, mildew resistant, lodging resistant			IAEA, 1974
Visir	Sweden, 1970	Pallas x "Long glumes"	Resistance to mildew, high yield, otherwise very similar to Pallas			IAEA, 1974
Juncus effusus L.						
Seto-nami	Japan, 1982	Gamma rays 68 kR growing plants 1963 [Asanagi]	High yield, long culm, good quality and good appearance of product (tatami-mat)	21	13	
Lactuca sativa L.						
Evergreen	Japan	^{32}P [Butterhead]	Heat tolerance	2	9	
Giantgreen	Japan	^{32}P [Butterhead]	Heat tolerance	2	9	

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Lens culinaris Medik.						
S-256 (Ranjan)	India, 1981	Radiation [B 77]	Spreading type, high yield	20	17	
Lespedeza cuneata Dum.						
Interstate	USA, 1970/71	Thermal neutrons 1957	Compact, fine-stem, leafy good tillering and seedling vigour			IAEA, 1974
Interstate 76	USA, 1979	Interstate x Ala L11	Resistance to Meloidogyne incognita et al. higher yielding than Interstate	16	19	
Lilium sp.						
Mies Bouwman	The Netherlands, 1977	X-rays, 1968 [Tabasco]	Orange flower colour, excellent forcing qualities	17	20	
TX 68-1	The Netherlands, 1977	X-rays, 1968 [Tabasco]	Orange flower colour, excellent forcing qualities	17	20	
Linum usitatissimum L.						
Dufferin	Canada, 1979	Redwood 65 x (4013 x Raja)	Similar to Redwood 65, but higher oil content and better resistance to Melampsora lini (Ehrenb.) Lev.	18	17	

Redwood 65	Canada, 1965	X-rays, 1951 [Redwood]	Higher oil content	5	13	
Lolium sp.						
Meritra, R.v.P.	Belgium, 1971	Colchicine, 1962-63 [Lemtal]	High yields, high carbohydrate content, good resistance to leaf disease			IAEA, 1974
Lupinus albus L.						
Dnepr	USSR, 1978	EI, cross with mutant		13	20	
Gorizont	USSR, 1977	EI, cross with alkaloid free mutant		13	20	
Kievsky Mutant	USSR, 1969	Fractioned irradiation 1958 and 1959 F_1 and F_2 [Hvanchkoly x sample from Syries]	High grain and forage yields, alkaloidless, high protein (44%) and lysine (6-8%) contents			IAEA, 1974
Lupinus angustifolius L.						
Chittick	Australia, 1982	EI 0.24%, seeds, 1961 [Borre] crosses with selected early flowering mutant	Early flowering	20	17	
Lupinus cosentini Guss.						
Eregulla	Australia, 1972	Complex crossing of mutants [Chapman]	Low alkaloid, early flowering, white flowers and seeds, non-shattering	12	14	

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Lupinus luteus L.						
Aga	Poland, 1981	X-rays, seeds, 1956 mutant population x Afus	Early maturing, resistant to Fusarium, high yield potential	19	15	
Lycopersicon esculentum Mill.						
Kyoryoku-reikou	Japan, 1974	Gamma rays, pollen of L. peruvianum, 1967 (Shugyoku x L. peruvianum)	Resistance to TMV and wilt (J-3) in L. peruvianum were introduced into the cultivar Shugyoku by breaking the cross-incompatibility with irradiation of pollen	21	14	
Luch 1	USSR, 1965	Gamma rays [Pushkinsky]	Early, high yielding, yield of red fruit 3-5400 kg/ha higher than parent variety	19	15	
Pusa Lal Meeruti	India, 1972	Gamma rays 30 kR dry seeds, 1959 [Meeruti]	Uniform fruit ripening, high yielding ability compared to parent variety, improved fruit colour			IAEA, 1974
S.12	India, 1969	Gamma rays, [Sioux]	Dwarf, 30% more yield than Sioux			IAEA, 1974
Malus pumila Mill.						
Belrene	France, 1970	EMS 1%, growing shoots 1961 [Reine des reinettes]	Earlier maturing, more coloured and bigger fruit, yield somewhat reduced	17	15	

Blackjoin BA 2 520	France, 1970	Gamma rays 5 kR dormant trees, 1963 [Jonathan Blackjoin]	Improved and more regular red coloured fruit	17	15	
Lysgolden (Goldenir)	France, 1970	Gamma rays 5 krad dormant trees, 1963 [Golden Delicious]	Fruit free of russetting, yield somewhat reduced	17	15	
McIntosh 8F-2-32	Canada, 1970	Gamma rays, shoots [McIntosh]	Improved skin colour, resistance to Podosphaera leucotricha and Venturia inaequalis	1 17	7 15	IAEA, 1974
Malus sp.						
Dovar	The Netherlands, 1978	X-rays 3-3.5 kR scions, 1969-70 [John Downie]	Variegated leaves	14	17	
Mentha arvensis L.						
Rose mint	Japan, 1977	Gamma rays cell culture [Japanese mint]	Improved yield and quality of oil with fragrance very similar to rose oil, price of oil from mutant is 20 times as high as ordinary mentha oil	15	13	
Mentha piperita L.						
Murray Mitcham	USA, 1976	X-rays 5-6 kR [Mitcham]	Verticillium wilt resistant improved first year yield over Todd's Mitcham	10	16	

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Todd's Mitcham	USA, 1971	X-rays 5-6 kR 1955-59, [Mitcham]	Verticillium wilt resistant, darker green herbage colour, smaller leaves, more erect and less branched plant habit, earlier maturity by 5-10 days	11	18	IAEA, 1974
Nicotiana tabacum L.						
American Bakhchesoraiskii	USSR, 1978	ENH, 1966 cross with mutant		13	21	
Chlorina F_1	Indonesia, 1934	X-rays, 1930 [Vorstenland]	Pale colour, high leaf quality			IAEA, 1974
Delhi 76	Canada, 1976	Gamma rays, 6 kR dry seed, 1970 [Delhi 34]	Similar in plant type to parent but slightly darker green, leaf cures easily with a more desirable orange colour particularly in the upper half of the plant, superior yield, reduced grown sucker development, higher disease tolerance	19	16	
Krupnolystnyi	USSR, 1977	ENH, 1966 cross with mutant		13	21	
Yubileinyi	USSR, 1978	ENH, 1966 cross with mutant		13	21	

Olea europaea L.

Briscola	Italy, 1981	Gamma rays 4 krad rooted cuttings, 1968 [Ascolana tenera]	Plant height reduced by 50% early entering production, easy harvest, male sterile	19	17	

Ornithopus compressus L.

Uniserra	Australia, 1971	EMS, seeds, 1962 [Pitman]	Early flowering and improved seed yield			IAEA, 1974

Oryza sativa L.

Ai Fu No. 9	China, 1966	Gamma rays 30 kR	Short culm, blast resistant higher yield	25	12	
Akihikari	Japan, 1976	Toyonishiki x Reimei	Short and stiff culm, high yielding capacity	11	17	
Arlatan	France, 1979	Gamma rays, 1970 [Arlesienne]	Improved threshability higher yield (15%)	18	15	
Atomita - 1	Indonesia, 1982	Gamma rays 20 krad 1974 [Pelita I/1]	Early maturity, improved resistance to Brown Planthopper, Biotype 1 and Green Leafhopper, blast, high tolerance to salinity, high protein content, good eating quality	21	15	
Atomita - 2 (627-5/PSJ)	Indonesia, 1983	Gamma rays 20 krad seeds, 1974 [Pelita I/1]	Salt tolerant, early maturing, resistant to BPH biotype 1, better resistance to blast, high protein content	23	18	

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BPI-121-407	Philippines, 1971	Gamma rays and mixed neutrons seeds, 1965 [BPI-121]	Early, short, stiff-strawed, high tillering, high yielding, good disease resistance, moderately resistant to bacterial leaf blight.	1	7	IAEA, 1974
Calendal	France, 1979	Gamma rays, 1970 [Arlesienne]	Longer grain, improved threshability, better tolerance to Sclerotium oryzae, same yield	18	16	
Calmochi 201	USA, 1979	Gamma rays 20 kR 1974, [S6]	Glutinous endosperm	15	12	
Calmochi 202	USA, 1981	(/Colusa x CS-M3/ x<u>D51/3</u>) x <u>Calmochi-201</u>	Semi-dwarf type, glutinous (waxy) grain, awnless	25	15	
Calpearl	USA, 1981	<u>Calrose 76</u> x (Earli-rose x IR1318-16)	More stiff culm and better lodging resistance than Calrose 76, 10% higher yield than Calrose 76 derivatives of comparable early maturity	23	18	
Calrose 76	USA, 1976	Gamma rays 25 kR 1969, [Calrose]	Short stature (ca 95 cm against 120 cm of Calrose) due to shortening of all internodes otherwise essentially unchanged	9	15	
CNM 6	India, 1980	X-ray 30 kR dry seeds, 1971 [IR 8]	Earlier maturing 15-23 days increased effective tillering, long grain; 10% higher yield per day, drought tolerant	18	17	

CNM 20	India, 1980	X-ray 30 kR pre-soaked seeds, 1971 [IR 8]	Earlier maturing 10-12 days, increased effective tillering, long grain, resistant to BLB, BLS, BPH	18	17	
CNM 25	India, 1979	X-ray 30 kR pre-soaked seeds, 1971 [IR 8]	Earlier maturing 14-25 days, increased effective tillering, long grain; 15% higher yield per day, resistant to thrips	18	17	
CNM 31	India, 1979	X-ray 30 kR pre-soaked seeds, 1971 [IR 8]	Earlier maturing 10 days, increased effective tillering, long grain; 9% higher yield per day, resistant to BLB, BLS, BPH, brown spot	17	17	
Delta	France, 1970	Gamma rays, 1961 [Cesariot]	Improved grain quality (increased grain length) with yielding ability maintained			IAEA, 1974
Dong Ting No. 3	China, 1982	Gamma rays and micro-waves, 1973 [Duanxin No. 3]	Short culm, lodging resist-ance, high yield, cultivated in 1982 on ca 120,000 ha.	21	14	
Er Fuzao	China, 1968	Gamma rays 30 kR [Er Jiuai No. 7]	Early maturity	25	12	
Fu 709	China, 1974	Gamma rays 30 kR [Nong Hu No. 6]	Higher yield, cold resistance	25	13	
Fujihikari	Japan, 1977	(/Fukei 71 x Fukei 67/ x Koshihikari) x R151	Season-neutral, ripening within ca. 100 days, most suitable in tight crop rotations	11	16	
Fulgente	Italy, 1973	X-rays 25 kR [Maratelli]	Blast resistant, high productivity	10	15	

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Fu Lianai	China, 1966	Gamma rays 20 kR [Lian Tangzao]	Short culm, blast resistance	25	12
Fu She 31	China, 1965	Gamma rays 25 kR [Lu Cai]	Early maturity, short culm, resistance to stress, suitable for mountain area	25	12
Fu She 94	China, 1971	Neutrons [Daai Zhi]	Early maturity, good tillering, blast resistance	25	13
Fu Wan 23	China, 1978	Gamma rays 30 kR [Hu Xuan]	Yellow stunt and Xanthomonas resistance, bigger spike and large grain, good quality	25	14
Fu Xuan No. 3	China, 1970	Gamma rays 30 kR [Fu Xuan No. 1]	Good tillering, blast resistance	25	13
Fu Xuan 124	China, 1972	Gamma rays 30 kR [Guang Xuan]	Blast resistance, intermediate maturity	25	13
Fu Yu No. 1	China, 1968	Gamma rays 15 kR [Er Jiuai No. 7]	10-15 days earlier than original variety, good stature	25	12
Fu Zao No. 2	China, 1970	Gamma rays 30 kR [Er Jiuai]	15 days earlier than original variety, bigger spike	25	13
Fu Zhu	China, 1979	Gamma rays 35 kR [Zhu Lianai]	Early maturity, cold tolerance, blast resistance lodging resistance	25	15
Guang Dabai	China, 1979	[Hong 410]	Intermediate maturity, higher yield	25	15

Guang Fu No. 1	China, 1981	Gamma rays + laser [Hong 410]	Mid-early maturity, good tillering	25	16
Gui Fu No. 3	China, 1977	Gamma rays 30 kR [Gui Luai No. 8]	Early maturity, cold resistance, blast tolerance	25	14
Hanahikari	Japan, 1975	(/Stripe 136 x Bikei 53/ x Bikei) x Fukei 70	Short and stiff culm, early, tolerant to low temperatures, good quality, good taste	21	14
Hayahikari	Japan, 1976	Reimei x Toyonishiki	Lodging resistance	11	16
Hong Nan	China, 1981	Gamma rays 30 kR [Hong Meizao x Guang Nan] F_2	Intermediate maturity, cold tolerance in seedling period, bigger spike	25	16
Houhai	Japan, 1976	Kojonishiki x Reimei	Short and stiff culm, tolerant to low temperatures	21	16
Huang Piai	China, 1969	Gamma rays 30 kR [Guang Pizhong]	Short culm	25	12
Hybrid Mutant 95	India, 1973	Gamma rays 50 kR 1966 [Jhona 349 x Taichung Native-1]	Short stature, short duration, high yield potential, photoperiod and thermo-insensitive; wide adaptability, high protein (12.3%) and high lysine (4.07%) content, covers more than 20,000 ha in the Punjab, very popular for transplanting late in the season and for multiple cropping schemes	4	14
Hyokei-sake 18	Japan, 1972	Yamadanishiki x IM-106	Short and thick culm, early maturing, large grain	21	14
IIT 48	India, 1972	Ethylene oxide 0.3% 8 h at 10°C [IR8]	One week earlier, finer grain, better test weight compared with IR8		IAEA, 1974

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IIT 60	India, 1972	EMS 0.5% 8 h 20°C 1968, [IR8]	One month earlier than IR8 with same yield potential			IAEA, 1974
IRAT 13	Ivory Coast, 1978	Gamma rays chronic 1972 [63 x 83]	Resistant to lodging	11	16	
Iratom 38	Pakistan, 1970	Gamma rays [IR-8]	3-4 weeks earlier and 2% higher in protein than mother variety			IAEA, 1974
Jagannath	India, 1969	X-rays 30 kR direct selection in M_2 [T.141]	Medium slender grain, good cooking quality, suitable for ill-drained soils during the main season			IAEA, 1974
Jia Sifu	China, 1973	Gamma rays 30 kR [Jia Hu No. 4]	Early maturity, short culm, good tillering	25	13	
Jin Fu No. 1	China, 1969	Gamma rays 30 kR [Jin Yin 37]	7 days earlier than original variety, blast resistance	25	12	
Jin Fu No. 8	China, 1969	Gamma rays 30 kR [Xiao Zhan 101]	Early maturity, shorter culm, Xanthomonas resistance	25	12	
Juang Yebai	China, 1978	Neutrons [IR_8]	Roll leaf, good stature, good tillering, blast resistance	25	14	
Kagahikari	Japan, 1973	Mutant of Koshihikari (gamma rays) x Fukei 72	Early maturity, improved grain quality and taste	11	16	

Kashmir Basmati	Pakistan, 1977	Gamma rays 25 kR 1969 [Basmati 370]	Early maturity, suitable to be grown in Azad Kashmir at 2000-5000 feet altitude, 30% higher yield than course varieties grown there	10	15	
Katsurawase	Japan, 1978	(/Fukei 67 x Fukei 71/ x Koshihikari)	Early maturing, short and stiff culm, resistant to blast	21	15	
Ke Fuhong No. 2	China, 1981	Mutant IR 8 x Hong 410	Early maturity, blast resistance	25	16	
KT 20-74	China, 1957	X-rays, [Ketze]	Higher yield, short growing period			IAEA, 1974
Milyang 10	Korea, 1970	X-rays, 1966 [Palkweng]	Short culms (76 cm) with erect leaves, resistant to lodging			IAEA, 1974
Mineasahi	Japan, 1980	Kanto 79 x Kohou	Early maturing, short culm, good quality, good taste, lodging resistant	21	15	
Miyama Nishiki	Japan, 1978	Gamma rays 30 kR 1972 [Takane-Nishiki]	Large grain, high frequency of white-core grain, optimal white-core size, suitable for "sake"-breeding	15	12	
Miyanishiki	Japan, 1978	Kanto 79 (gamma rays induced short culm mutant of Koshihikari) x Todorokiwase 1970	Early heading, short culm, improved lodging resistance	17	13	
Miyuki-mochi	Japan, 1979	Gamma rays 20 kR 1974 [Toyonishiki]	Glutinous endosperm, main characters as parent variety such as high yield, disease and lodging resistant	15	12	

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Musashikogane	Japan, 1981	Tamakei 56 x Aichi 21	Short culm, lodging resistance	21	16	
Mutsuhonami (formerly Fukei No. 90)	Japan, 1973	Etsunan 39 (Wakakusa) x Fukei 70 (Reimei)	Good quality, good taste			IAEA, 1974
Mutsukaori	Japan, 1981	Mutsunishiki x Fukei 104 (Akihikari)	Short culm, lodging resistance	21	16	
Mutsukomachi	Japan, 1981	Mutsunishiki x Fukei 104 (Akihikari)	Short culm, lodging resistance	21	16	
M-101	USA, 1979	(CS-M3 x Calrose 76) x D31	Short stature and early maturity, 10% yield increase	15	13	
M114	China, 1981	Gamma rays 30 kR [5450 xYinni Suitiangu]	Cold tolerance, Fulgorid resistance	25	16	
M-301	USA, 1980	(Calrose 76 x CS-M3) x M5	Medium grain shape, intermediate maturity, short stature, daylength tolerant, lodging resistant	18	16	
M-302	USA, 1981	(Calrose 76 x CS-M3) x M5	Semi-dwarf type, intermediate maturity, medium grain shape, more lodging resistant, higher yielding than M-301	25	15	
M-401	USA, 1981	Gamma rays, seeds, 1974, [Terso]	Semi-dwarf height, consequently higher yield, premium quality, medium grain size	19	16	

M7 (CI9967)	USA, 1977	Calrose 76 x CS-M3	Short stature, higher yield than both parents	13	19	
Nadahikari	Japan, 1977	(580-19 x Hyokei-sake 18) x Tokinkei 1011	Short culm, large grain, high yield, leaf blast resistant	21	15	
Nan Jing No. 34	China, 1976	Gamma rays 30 kR and microwave, 1971 [Zhaofang]	Short stature, high yield 1981 cultivated on ca.220000 ha. in Jiangsu province and lower reaches of the Yangtze river	19	16	
Niigatawase	Japan, 1979	Fukei 91 x Naga 60	Short culm, lodging resistance, high yield	21	15	
Nucleoryza	Hungary, 1972	Fast neutrons, 1966 [Cesariot]	Earliness, with maintained blast resistance and improved yield	2	8	IAEA, 1974
PARC 1	Philippines, 1970	Gamma rays 40 kR 1966 [IR-8-288-3]	Narrower and longer grains with less chalky areas	4	14	IAEA, 1974
PARC 2	Philippines, 1970	Gamma rays 40 kR 1966 [IR-8-68]	5-10 days earlier maturity, slightly narrower and much longer grains with less chalky areas, good eating quality, high acceptance by farmers	4	14	IAEA, 1974
RD 6	Thailand, 1977	Gamma rays 20 kR 1965 [Khao Dawk Mali 105]	Glutinous endosperm and improved blast resistance	10	15	
RD 10	Thailand, 1981	N_f 1 kR , 1969 [RD 1]	Glutinous endosperm otherwise like RD 1, daylength tolerant, 130 days to maturity, high yield, slender grain, moderate resistance to blast and BLB	18	16	

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RD 15 (KDML 105' 65 G_1 -U-45	Thailand, 1978	Gamma rays 15 kR 1965 [Khao Dawk Mali 105]	10 days earlier maturity, better drought resistance	13	19	
Reimei	Japan, 1966	Gamma rays 20 kR dry seeds 1959, [Fujiminori]	Short straw, lodging resistant, tolerates lower temperatures, especially during germination and seedling stages			IAEA, 1974
Rokkonishiki	Japan, 1982	(5810-19 x Hyokei-sake 18) F_1 x Tokinkei 1011	Large grain	21	16	
Sachiminori	Japan, 1978	(Manryo x R_4-B) x Yamasenishiki	Stiff culm, resistant to blast	21	15	
Shinanosakigake	Japan, 1982	Gamma rays 20 kR 1973, [Toyonishiki]	Large grain	21	17	
Shirakabanishiki	Japan, 1982	Gamma rays 20 kR 1973 [Reimei]	Large grain, high frequency of white core grain, suitable for sake brewing	21	17	
Shuang Chengnuo	China, 1980	Gamma rays 30 kR [2004]	Compact type, lodging resistance, good taste	25	15	
Schuang Ke No. 1	China, 1981	IR 24 x Ke Fuzao	Intermediate maturity, higher yield, higher temperature tolerance	25	16	
Shwe Thwe Tun (IR 24 M4-17)	Burma, 1981	Gamma rays 30 kR [IR 24]	Slightly taller than IR 24, higher amylose content, fairly high yield	20	18	

Shwe War Tun	Burma, 1975	Gamma rays 25 kR seeds, 1971, [IR5]	Improved grain quality, higher yield, slightly earlier and taller, 1975 15,000 ha cultivated	12	17	
Sui Fu 17	China, 1979	Gamma rays 30 kR [Sui Yia 156]	40 cm shorter than original variety, higher yield	25	15	
S 201	USA, 1980	(Calrose 76 x CS-M3) x S6 1974	Short stature, resistant to lodging, short grain, early maturing, daylength tolerant	18	16	
SH 30-21	China, 1957	X-rays, 1957 [Shung-chiang]	Higher yield, short growing period			IAEA, 1974
Wan Fu 33	China, 1978	Gamma rays 30 kR [72-10]	Early maturity, cold resistance, blast tolerance	25	14	
Wan Geng 257	China, 1975	Gamma rays 30 kR [Hu Xuan 19]	Fertilizer tolerance, blast resistance, higher yield	25	14	
Xiang Fudao	China, 1976	Gamma rays 30 kR [Er Jinging]	Cold tolerance in seedling period, blast and Xantho-monas resistance	25	14	
Xiao Fuzao	China, 1974	Gamma rays 30 kR [Lian Tangzao]	Early maturity, short culm	25	13	
Xiong Yue 613	China, 1965	Gamma rays 20 kR [Nong Keu 20]	Moderate resistance to blast, higher yield, good quality	25	11	
YH 1	China, 1963	Taichung No. 1 x SH 30-21	Higher yield, short growing period			IAEA, 1974
Yi Funuo No. 1	China, 1973	Gamma rays 10 kR [IR8]	Blast resistance, bigger spike, higher grain number	25	13	

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Yuan Fengzao	China, 1975	Gamma rays 35 kR dry seeds, 1971 [Kezi No. 6]	45 days earlier than Kezi No. 6, 10% higher yield than local commercial variety, 8-14% higher lysine content than other main commercial varieties, in 1980 cultivated on 1.07 million ha	19	16	
Zhe Fu 802	China, 1980	Gamma rays 30 kR [Si Mei No. 2]	Early maturity, higher yield, disease resistance	25	15	
Zhen Fu No. 1	China, 1971	Gamma rays 30 kR [Zhen Shuai]	10 days earlier than original variety, good tillering, lodging resistance	25	13	
Zheng Guang No. 1	China, 1978	Gamma rays 30 kR [Tai Zhongyu 39]	Yellow stunt resistance	25	14	
Zhong Bao No. 2	China, 1976	Fast neutrons	Early maturity, short culm	25	14	
7738	China, 1980	Gamma rays 30 kR [Guang Beiguang]	Early maturity, higher yield, planthopper resistant	25	15	
Pennisetum americanum L.						
New Hybrid Bajra 5 (NHB5)	India, 1974	Gamma rays 35 kR [male sterile inbred line Tift 23A]	Resistance against Sclerospora graminicola by using resistant mutant line 5071A as male sterile parent	11	18	

Pusa 46	India, 1982	Radiation [J104 x K559]	Both parents of original hybrid are susceptible to downy mildew, after irradiation the resistant line M46 was selected which is used as male parent for the Hybrid Variety Pusa 46	23	19	
Phaseolus vulgaris L.						
Alfa	CSSR, 1972	EMS, 0.2%, 1966 [Black bean]	White seed colour, improved seed and protein yield, earliness, resistance to Colletotrichum lindemuthianum, cooking quality	10	16	
Giza 80	Egypt, 1980	Gamma rays 10 kR air dry seeds, 1973 [Fin de Villeneuve]	Rust resistant, 12% higher yield, higher TGW, white seed coat, higher protein content, cooking time for dry seeds reduced	17	14	
Gratiot	USA, 1962	X-rays, 1938 [Michelite], selection from cross involving Michelite, Michelite mutant and B 1788	Same as for Sanilac except stiffer straw, added resistance to bean common mosaic virus 15, higher protein content			IAEA, 1974
Pusa Parvati	India, 1970	X-rays, dry seeds 1959 [Wax Podded]	Early bushy type with attractive round meaty, light-green pods, 40-45 days maturity, about 45% higher yield			IAEA, 1974

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Sanilac	USA, 1956	X-rays, 1938 [Michelite] selection from cross involving Michelite mutant, Robust, Crawford, Emerson 847 and Emerson 53	Bush type, early maturity, resistant to alpha, beta and gamma races of Colletotrichum lindemuthianum (anthracnose) and bean common mosaic virus 1 and 123, tolerant to Sclerotinia sclerotiorum (wilt or white mould)		IAEA, 1974
Saparke 75	USSR, 1967	Gamma rays 7 krad seeds, 1958 [Tzanava-31]	Surpasses initial variety on average by 5.5 t/ha in green pod yield and 0.52 t/ha in seed yield, green pods devoid of fibre and 5-6 cm higher on stem, making mechanical harvesting possible, improved resistance to bacterial diseases		IAEA, 1974
Seafarer	USA, 1967	X-rays, 1938 [Michelite], selection from cross involving Michelite, Michelite mutant, Trag 279-1, Florida Belle and Emerson 847	Very early maturity, bush-type, resistant to alpha, beta, gamma races of Colletotrichum lindemuthianum and bean common mosaic virus 1, 15 and 123		IAEA, 1974
Seaway	USA, 1960	X-rays, 1938 [Michelite], selection from cross involving Michelite, Michelite mutant and Topcross	Short-season, upright bush-type, resistant to bean common mosaic virus 1, 15 and 123		IAEA, 1974

Unima	FRG, 1957	Selection from Granda x Universal	Immune to Colletotrichum lindemuthianum, resistant to Pseudomonas phaseolicola			IAEA, 1974
Universal	FRG, 1950	X-rays 300 R, 1938 [Granda]	Early maturity, higher yield, good resistance to Colletotrichum lindemuthianum			IAEA, 1974
Pisum sativum L.						
Esedra	Italy, 1980	X-rays 750 rad, pollen, 1971 [Sprinter]	4 days later flowering, increased yield, more contemporary pod setting, better suitable for mechanical harvesting	19	17	
Hamil	Poland, 1981	Cross (Wasata x 1.6L/78) x Porta	Change of leaflets to tendrils, early maturity, high yield, lodging resistant, suitable for combine harvest	18	17	
Hans	India, 1979	EI. 1967 [Pl163]	Higher yield	15	13	
Moskovsky 73	USSR, 1974	DES, 0.03% 1967 [Nemchinovsky 766]	Larger grain, higher protein content	12	14	
Navona	Italy, 1980	X-rays 750 rad, pollen, 1971 [Sprinter]	One week later flowering, reduced plant height, more contemporary pod setting, longer period for canning	19	17	
Stral-ärt	Sweden, 1954	X-rays 15 kR presoaked seeds, 1941 [Kloster]	Vigorous development, 2-6% higher seed yield, high regenerative capacity, stable yield			IAEA, 1974

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Sum	Poland, 1979	Porta x Wasata	Shorter plant type, larger seed than Wasata, very high yield potential, edible pea, in 1980 50 ha seed multiplication	15	13
Wasata	Poland, 1979	Gamma rays 50 krad 1965 [line 5/2]	Change of leaflets to tendrils - higher harvest index, early maturing ca. 103 days, high yield, lodging resistant, fodder pea, suitable for combine harvest, in 1980 250 ha seed multiplication	15	13
Polyanthes tuberosa L.					
Rajat Rekha	India, 1974	Gamma rays 2 kR [single flowered cv.]	Leaves with silvery white streaks along the middle of blade	14	17
Swarna Rekha	India, 1974	Gamma rays 2 kR [double flowered cv.]	Leaves with golden yellow streaks along their margins	14	17
Populus trichocarpa L.					
Donetskii Zolotoi	USSR, 1977	Gamma rays 50-150 R cuttings	Variegated leaves, annual height increment 1.5-1.8 m under dry conditions and over 3 m under wet conditions	15	17

Portulaca grandiflora L.

Five Petal	India, 1974	Gamma rays 2.5 kR cuttings	Profusely flowering with 5 petaled flowers	20	19
Jhumka	India, 1974	Gamma rays 1 kR 1965, [Karna Pali]	Flowers about 2.5 cm in diameter with nearly 48 dissected obtuse-tipped petals per flower.	14	17
Karna Pali	India, 1974	Gamma rays 4 kR, 1965 [Portulaca double]	Flowers about 3 cm in diameter with about 47 acutely tipped dissected petals per flower	14	17
Karna Phul	India, 1974	Gamma rays 1 kR cuttings [P. grandiflora]	Gerbera type, narrow petals, young flower buds have split petals	17 20	20 19
Lalita	India, 1974	Gamma rays 4 kR, 1965 [Portulaca double]	Flowers incurving, about 2.5 cm in diameter, with about 55 petals, white petals in upper half when temperature and humidity are high	14	17
Mukta	India, 1974	Gamma rays 4 kR, 1965 [Portulaca double]	Flowers about 2 cm in diameter and almost round each having about 43 in-curved petals with white tips	14	17
Pink colour	India, 1974	Gamma rays chronic 15 kR, potted plants	Pink colour	20	19
Ratnam	India, 1974	Gamma rays 4 kR 1965	Flower diameter 4.5 cm, single flowers with 5-8 petals, cross fertile	14 15	18 17

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Rosy green	India, 1974	Gamma rays chronic 10 kR, potted plants	Non-opening flowers with rosy green periphery, light green centre	20	19	
Semi-double	India, 1974	Gamma rays 10 kR potted plants	Five outer petals, petals in 4 rows	20	19	
Vibhuti	India, 1974	Gamma rays 4 kR 1965	Incurved flowers, about 3 cm in diameter with nearly 50 petals having 5 mm wide white margin in summer only. Occasional branch on mutants producing normal double flowers needs to be removed.	14 15	18 17	
Prunus armeniaca L.						
Early Blenheim	Canada, 1970	Thermal neutrons shoots [Blenheim]	Matures one week earlier than parent, annual yielding, pollen self-incompatibility	1	7	
Prunus avium L.						
Compact Lambert	Canada, 1964	X-rays 4 kR, scions, 1958, [Lambert]	Desirable compact and dwarf growth habit combined with very early and very heavy cropping, fruit size slightly reduced			IAEA, 1974
Compact Stella 35B-11	Canada, 1974	X-rays 4 kR, scions, 1964, [Stella]	Compact growth, otherwise like Stella	4	8	IAEA, 1974

Lapins	Canada, 1983	Van x Stella selected 1971	Larger firmer fruit, resembles Lambert, ripens two days later, upright growth habit, self-fertile, more productive than most commercial cultivars	25	17	
Stella	Canada, 1968	Lambert x John Innes Seedling 2420 (self fertile mutant by X-ray treatment of pollen), 1956	First good quality self-fertile sweet cherry			IAEA, 1974
Sunburst	Canada, 1983	Van x Stella selected 1971	Fruit resembles Stella, very large and resists rain splitting, not as firm as Bing or Van, matures with Van, good growth habit, self fertile, very productive	25	17	
Prunus cerasus L.						
Karlik Samorodka	USSR, 1979	Gamma rays, buds	Dwarf type	18	18	
Plodorodnaya michurina	USSR, 1977	X-rays	Fruit set without pollination	19	17	
Polukarlik Orlovskoi Rannei	USSR, 1979	Gamma rays, buds [Orlovskoi Rannei]	Semi-dwarf type	18	18	
Polukarlik Turgenevki	USSR, 1979	Gamma rays, buds, [Turgenevka]	Semi-dwarf type	18	18	
Prunus persica L.						
Magnif 135	Argentina, 1968	Gamma rays chronic 1962-63 [Magnif 43]	Bigger fruit with deeper red skin colour, 7 days earlier maturity			IAEA, 1974

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Plovdiv 6	Bulgaria, 1981	Halle x Dupnishka Gamma rays pollen of [Dupnishka] 1966	Higher yield, large fruit, good quality, middle early flowering	18	19	
Punica granatum L.						
Karabakh	USSR, 1979	Gamma rays 5-7 krad seeds		18	19	
Khyrda	USSR, 1979	Gamma rays 5-7 krad seeds	Dwarf type	18	19	
Rhododendron sp.						
Adinda	Belgium, 1972	X-rays recurrent irradiation, 1968 [Karl Glaser]	Flower colour change from blue-red towards yellow-red.	6	15	
Aleida	The Netherlands, 1978	X-rays 1500 rad plants, 1967 [Vuyck's Scarlet]	Bright-orange flower colour, flower diameter 6-7.5 cm.	14	18	
Cobalt	Japan, 1973	Gamma rays 5 kR 1964, [Takasago]	Small petals and leaves due to dwarfness, more elegant than original variety			IAEA, 1974

Enzet-Rolko	GDR, 1969	X-rays 2 kR, 1959 [Ernst Thiers]	Smaller petals resulting in elegant flower, colour darker than original variety			IAEA, 1974
Enzet-Rokola	GDR, 1969	X-rays 5.5 kR, 1959 [Mme. John Haerens]	More intense flower colour changed from pink to bright-red, no change in flower colour when wilting			IAEA, 1974
Eroica	Belgium, 1974	Gamma and X-rays recurrent irradiation 1965-70 [Knut Erwen]	Flower colour change from blue-red towards intense red (snythesis of flavonols is partially stopped, anthocyanins unchanged).	6	15	
Mira	Belgium, 1972	Gamma and X-rays recurrent irradiation 1965-69 [Euratom]	Flower colour change from blue-red towards intense red	6	15	
Mevr. R. de Loose	Belgium, 1974	Gamma and X-rays recurrent irradiation 1965-69 [de Waele's Favorite]	Flower colour change from blue-red with white edge towards yellow-red, synthesis of flavonols is completely stopped, anthocyanins are unchanged	6 9	14 15	
Pastorale	Belgium, 1973	Gamma and X-rays recurrent irradiation 1965-70 [de Waele's Favorite]	Flower colour change from blue-red with white edge towards blue-red with very small white edge.	6	15	
Saidjah	Belgium, 1972	Gamma rays recurrent irradiation 1965-66, [Euratom]	Flower colour change from blue-red towards yellow-red	6	15	

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Sierra Nevada	Belgium, 1974	Gamma and X-rays recurrent irradiation 1965-66 [de Waele's Favorite]	Flower colour change from blue-red with white edge towards yellow-red with very small white edge, synthesis of flavonols completely stopped, anthocyanins unchanged	6	15	
Ribes sp.						
Westra	FRG, 1968	X-rays 1.5 kR, 1949 [Westwick Choice]	Strong erect habit	17	15	
Ricinus communis L.						
Aruna	India, 1969	Thermal neutrons 1.4 krad, 1965	Very early 120 days versus 270 days for mother variety, yield slightly higher			IAEA, 1974
RC8	India, 1978	Gamma rays 40 kR [Rc 1188-54]	In comparison to Aruna castor taller, longer growth period, higher TKW, higher yield	16	18	
Sowbhagya (157-B)	India, 1976	(Aruna x dwarf mutant of HC-6) x (dwarf mutant of HC-6 x Mauthner's dwarf)	Long duration, dwarf type, non-shattering, suitable particularly for intercropping	11	17	

Rosa sp.

Angara	India, 1975	[Montezuma]	Very vigorous, compact and profuse blooming, darker reddish orange in colour, slightly more fragrant than the parent	14	19	
Dark Mario	FRG, 1983	X-rays 1.8 krad unrooted cuttings, 1982 [Mario]	Dark pink flower colour original variety pink	23	20	
Desi	GDR, 1965	X-rays 3 kR, 1956 [Gloria Dei]	Intense colours, dark-red stripes on yellow petals			IAEA, 1974
Flamingo Queen	Canada, 1976	X-rays 7-8 kR, 1964 [Queen Elizabeth]	Salmon pink flower colour	17	21	
Golden Geos	FRG, 1981	X-rays 1.8 krad unrooted cuttings, 1980 [Geos]	Yellow flower colour original variety white	23	19	
Madhosh	India, 1975	EMS 0.25% budwood [Gulzar]	Petals have mauve coloured stripes contrasting with the deep red base	14	19	
Milena	CSSR, 1964	[Elizabeth-Rose]	A warmer pink colour than the parent cultivar	14	18	
Orange Mario	FRG, 1983	X-rays 1.8 kR unrooted cuttings, 1982 [Mario]	Orange flower colour original variety pink	23	20	
Permoser	GDR, 1970	Radiation 1.5 kR, buds [Kordes Perfecta]	More intense colour of petal margin, otherwise like parent	7	14	

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Saroda	India, 1983	Gamma rays 3 krad 1978, bud wood [Queen Elizabeth]	Very light pink instead of carmine rose flowers	23	19
September Wedding	Canada, 1964	Radiation [Montezuma]	Flowers deep pink, reverse darker	14	18
Sukamari	India, 1983	Gamma rays 3 krad 1979, bud wood [America's Junior Miss]	Almost white instead of coral-pink flowers	23	19
Tangerine Contempo	India, 1983	Gamma rays 3 krad 1980, bud wood [Contempo]	Tangerine orange flowers with yellow eye instead of orange flowers with yellow eye	23	19
Yellow Contempo	India, 1983	Gamma rays 3 krad 1980, bud wood [Contempo]	Yellow flowers instead of orange with yellow eye	23	19
Saccharum officinarum L.					
Co 997 mutant	India, 1967	Gamma rays, buds [Co 997]	Resistant to red rot	12	17
Co 6608	India, 1966	Gamma rays, buds [Co 449]	Resistant to red rot	12	17
Nanei	Japan, 1981	Gamma rays chronic growing cane, 1976 [Ni 1]	Longer, thicker stalk, better tillering than Ni 1, higher yield of cane and sugar than NCo 310	19	17

Secale cereale L.

Donar	GDR, 1981	ISO-PMS, seeds [Petkuser Winterroggen Stamm 267/70]	20-25 cm shorter culm, better lodging and sprouting resistance	23	20
Hankkija's Jussi (Hja 6900)	Finland, 1975	Gamma rays 10 krad [Vjatka]	Good winter hardiness, short stiff straw, good quality	7	12
Pollux	GDR, 1981	ISO-PMS, seeds [Petkuser Winterrogen Stamm 267/70]	20-25 cm shorter culm better lodging resistance	23	20

Sesamum orientale DC.

Kalika (BM 3-7)	India, 1980	EMS 1%, presoaked seeds 6h, room temperature, 1974 [Binayak]	dwarf, compact branched type increased number of seeds per capsule, increased yield by ca. 15%	17	14

Sinapis alba L.

RLM 198	India, 1975	Radiation [RL 18]	Increased oil content and yield, about 5-6 days later maturing compared to parent variety RL-18	7	13
Seco	Sweden, 1961	Primex x Rumanian	Superior to Primex in seed yield, content of crude fat, early maturity and stalk stiffness, also resistant to shattering	6	14

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Svalöf's Primex	Sweden, 1950	X-rays 35 krad seeds, 1941 [Svalöf's White Mustard]	Higher seed yield and percent oil			IAEA, 1974
Trico	Sweden, 1967	Selection from Primex	Increased seed yield and oil content over Primex	6	14	
Solanum khasianum Clarke						
RRL-20-2	India, 1975	Gamma rays, 1969 [Dehradun local]	Higher solasodine content of berries, less spines 2000 ha cultivation in 1975-76	13	21	
Solanum tuberosum L.						
Konkei No. 45	Japan, 1973	X-ray 3 kR, 1962 [Benimaru]	Skin colour red-yellowish white			IAEA, 1974
Mariline 2	Belgium, 1968	X-rays 5 kR 1966, [Mariline]	Better yield and improved tuber skin colour			IAEA, 1974
Sorghum bicolor L.						
Jin Za No. 1	China, 1970	3197A x Jin Fu No. 1	Quality improved, higher yield, wide adaptability	25	17	

Long Fuliang No. 1	China, 1979	Gamma rays 20 kR [Xin Liang No. 7]	Early maturity, short straw, suitable for close planting	25	17	
Streptocarpus sp.						
Albatros	The Netherlands, 1973	Colchicine, leaves 1971, [mutant 7111 of Maassen's White]	Large white flowers, sturdy flower stalk, comparatively compact	17	21	
Blue Nymph	The Netherlands, 1969	X-rays, leaves, 1966 [Constant Nymph]	Light-blue flower colour, finer plant growth, rest of genotype unchanged			IAEA, 1974
Burgund	FRG, 1978	X-rays 3 krad, 1975 [Juwel]	Flower colour, rather compact stature of the plant	14	19	
Cobalt Nymph	The Netherlands, 1969	Colchicine and X-rays treatment 1966, [Constant Nymph]	Compact plant, dark-blue flowers, tetraploid			IAEA, 1974
Gloria Rot	FRG, 1978	X-rays 3 krad, 1975 [Gloria rosa]	Red flower colour, other characteristics unchanged	14	19	
Juwel	FRG, 1978	X-rays 3 krad, 1975 [Laura]	White flower colour, relatively small leaves and short flower stalks	14	19	
Kefora	FRG, 1977	X-rays 3.4 kR leaves, 1972 [Constant Nymph] F_1 hybrid of two mutants, 1974	Longer stems with higher number of smaller and dark-blue flowers of changed shape	10	17	
Margaret	UK, 1974	X-rays 6 krad, leaves 1970, [Constant Nymph]	Very freely flowering during winter	17	21	

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Mini Nymph	The Netherlands, 1969	X-rays, leaves, 1966 [Constant Nymph]	Compact growth, very free flowering, rest of genotype unchanged			IAEA, 1974
Mutara	FRG, 1977	X-rays 3.4 kR leaves, 1972 [Constant Nymph] F_1 hybrid of two mutants, 1974	Compact plant with shorter leaves and stems, flowers "papilionaceous", dark-blue	10	17	
Neptun Rosa	FRG, 1978	X-rays 3 krad, 1975 [Neptun]	Pink flower colour, other characteristics unchanged	14	19	
Netta Nymph	The Netherlands, 1969	X-rays, leaves, 1966 [Constant Nymph]	Dark-blue netted and picotee flowers, extremely free flowering			IAEA, 1974
Nicky	FRG, 1979	X-rays 3 krad, 1977 [Neptun]	Darker blue flower colour, free-flowering, compact growth habit and shorter leaves	16	21	
Purple Nymph	The Netherlands, 1969	X-rays and colchicine combined treatment leaves, 1966 [Constant Nymph]	Larger flower and more purple flower colour, plant more sturdy, rest of genotype unchanged	5	15	IAEA, 1974
Rosalinda	FRG, 1978	X-rays 3 krad, 1975 [Juwel]	Pink flower colour	14	19	
Snow-white	The Netherlands, 1973	X-rays 3 krad leaves, 1969 [Maassen's White]	Dwarfy growth-habit with upright white flowers			IAEA, 1974

Violetta	FRG, 1977	X rays 3.4 kR leaves, 1972 [Constant Nymph] F_1 hybrid of two mutants, 1974	Dark lilac coloured flowers, light green leaves	10	17	
Weisse Glocke	FRG, 1978	X-rays 3 krad, 1975 [Helle Glocke]	White flower colour, rather compact growth habit	14	19	
Trifolium incarnatum L.						
Cardinal	CSSR			6	13	
Trifolium pratense L.						
Rotra, R.v.P.	Belgium, 1967	Colchicine, 1951-56	High yield of green mass and dry matter per ha., highly resistant to Sclerotinia trifoliorum, Ditylenchus dipsaci and frost			IAEA, 1974
Trifolium subterraneum L.						
Uniwager	Australia, 1967	EMS, seeds, 1962 [Geraldton]	Almost free of isoflavons, negligible oestrogenic activity in sheep, however, reduced productivity			IAEA, 1974

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Triticum aestivum L.					
Altimir 67	Bulgaria, 1979	Gamma rays 5 krad F_2 seeds [Skorospelka x Mexipak]	Productive spikes resistant to stem and leaf rust and powdery mildew	16	17
Carolina	Chile, 1981	Gamma rays 10 krad seeds, 1972 [Collafen]	Yield, grain protein content, disease resistance, slightly delayed maturity	19	18
Chang Wei 19	China, 1978	Gamma rays 35 kR [Hair Yafu]	Resistance to stripe rust and mildew, salt and alkaline tolerance, higher yield	25	19
Chang Wei 20	China, 1979	Gamma rays 35 kR [Hair Yafu]	Stripe rust resistance, fertility tolerance, good quality	25	19
Claudia (see Mv8)	Italy, 1979			16	17
Els	FRG, 1960	X-rays 1.3 - 2.5 kR single grain bulk 1953, 54, 55 [Erli x (Lichtifrüh x Tr.carthlicum)]	Short straw, lodging resistance, good baking quality, commercially used until 1963	9	14
E Mai No. 6	China, 1966	Gamma rays 30 kR [Nan Da 2419]	Rust resistance, higher and stable yield, wide adaptability	25	17
Hankkijas Taava (Hja 12689)	Finland, 1978	Gamma rays 20 kR, 1966 [Ruso]	Slightly increased yielding ability and sprouting resistance, equally early, more resistant to lodging	13	19

IAS 63	Brazil, 1974	Gamma rays, seeds, 1960 [IAS 20 - Jassul] Pel 18102-62 x Pel 19906-62, 1963	Higher yield, less grain shedding, more resistant to stem rust (races 11/65 17/61, 17/63)	19	18
Jauhar-78	Pakistan, 1979	N_f 600 rad, 1972 [Nayab]	High yield, improved grain colour (amber)	18	14
Jien Mai No. 2	China, 1969	Gamma rays 20 kR [Beijing No. 6]	Early maturity, drought tolerance, stripe rust resistance	25	18
Jing Fen No. 1	China, 1977	Gamma rays 10 kR [Shi Jiazhuang 63]	Early maturity, short culm, lodging resistance	25	19
Kijanka	USSR, 1981	dES 0.0125%, seeds 1968	High yield	25	20
Lewis	USA, 1964	Thermal neutrons [Mo. W6185]	Lodging resistant, early maturity, high yielding	IAEA, 1974	
Lu ten No. 1	China, 1968	Gamma rays 30 kR [Hui Xianhong]	Bigger spike, large grain, stripe rust resistance	25	
Mv 8	Hungary, 1978	Gamma rays 1.5 kR soaked and vernalized seeds, 1962 [Bezostaja I;Ranka III] cross (mutant of Bezostaja I x mutant of Ranka III) 1965	Short culm, strong straw lodging resistant, 1980 cultivated on ca. 120,000 ha. in Hungary	16	17
Nan Jing No. 3	China, 1976	Gamma rays 25 kR 1968, [St. 1472/506]	Short culm, strong straw, lodging resistance, high yield, 1981 cultivated in ca. 140,000 ha. in Jiangsu province	19	19
Nan Yang 75-6	China, 1979	Gamma rays + dES [F_2 (St2422/464 x Nei Xiang No. 5)]	Uniform, stripe rust resistance	25	20

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Ning Mai No. 3	China, 1973	Gamma rays [st2422/464/506]	Bigger spike, more resistance to stem and leaf rust and powdery mildew	25	19	
NI - 5643	India, 1975	Radiation, 1962 [New Thatch x NI-284-S]	Maturity in 120 days, amber coloured, bold lustrous grain, 3500 kg/ha., res. to stem rust, suitable for irrigated conditions in Maharashtra State	19	18	
Novosibirskaja 67	USSR, 1969/70	Gamma rays 5 krad air-dry seeds [Novosibirskaja 7]	Lodging resistance, baking quality			IAEA, 1974
NP 836	India, 1961	X-rays 16 krad dry seeds(12%), 1955 [NP 799]	Fully awned, higher yield (10%), medium-early maturity (140 days), high leaf rust resistance, grows better than parent in unirrigated areas			IAEA, 1974
Odesskaja Polukarlikovaja	USSR, 1975	Karlik 1 x Odesskaja 51 (MNH mutant)	Semi-dwarf type, lodging resistance, high productivity	14	11	
Odesskaja 75	USSR, 1975	Karlik 1 x Odesskaja 51 (MNH mutant)	Semi-dwarf type, lodging resistance, high productivity	14	11	
Payne	USA, 1981	Triumph 64/Teewon Sib/ Sturdy	Teewon Sib is a translocation line from X-rayed Wichita 2 x TAP48 carrying Lr24 gene for leaf rust resistance	19	18	

Polukarlikovaja-49	USSR, 1978	ENH, 1966 [Besostaja I] cross with mutant	Short culm	13	20	
Pusa Lerma	India, 1971	Gamma rays, seeds 1965, [Lerma Rojo 64-A]	Amber grained, higher extensibility, elasticity and Pelshenke value, suggesting stronger gluten			IAEA, 1974
Qun Zhong 42	China, 1968	Gamma rays 30 kR [Nan Noundaheimang]	Bigger spike, large grain stripe rust resistance	25	18	
Shan Nong Radio-63	China, 1980	Gamma rays 30 kR [F4 of (You-bao x Ou-rou)]	Quick grain filling, good photosynthetic ability, effecient use of fertilizers, high and stable grain weight, 1981 cultivated on 130,000 ha.	19	19	
Sharbati Sonora	India, 1967	UV 2600 A + gamma rays 20 krad dry seeds (12%) 1 h 1963, [Sonora 64]	Short straw, early maturity, amber grain colour (preferred in India), higher protein and lysine content, good nutritive and chapati (unleavened bread) making quality	6	16	IAEA, 1974
Shirowase-komugi	Japan, 1977	Gamma rays 25 kR 1966, [Shirogane-komugi]	Changed plant type (closed stature)	21	17	
Sinvalocho Gama	Argentina, 1962	Gamma rays 20 krad 1956 [Sinvalocho]	More resistant to black stem rust and leaf rust			IAEA, 1974
Sirius	FRG, 1969	X-rays 15 kR, 1951,52 [Weihenst. Stamm Noha] x Stamm GZ Ho LiHe	Good lodging resistance and baking quality	9	14	

Name of new variety	Place and date of release (or approval)	Kind and date of mutagenic treatment [treated variety, line, clone...] or mutant crosses (mutant underlined)	Main improved attributes of variety	Reference		
				MBNL Issue	Page	other
Stadler	USA, 1964	Thermal neutrons [Mo. W6243]	Early maturity, strong straw, good yielding ability, excellent soft quality grain, good disease resistance and winter hardiness			IAEA, 1974
Tai Fu No. 1	China, 1966	Gamma rays 20 kR [Noun Da 1983]	Early maturity, stripe rust resistance, drought tolerance	25	17	
Tai Fu 23	China, 1968	Gamma rays 20 kR [Noun Da 183 x Nei Xiang No. 5]	Drought tolerance, dry and hot wind tolerance	25	18	
Wan Yuan 28-88	China, 1979	Gamma rays [F_2 (St2422/464 x Nei Xiang No. 5)]	Shorter straw	25	20	
Xin Shu Kuang No. 1	China, 1971	Gamma rays 8 kR [Abo M_4 x Orofen]	Disease resistance, strong stalk, large grain	25	19	
Yan Noun 685	China, 1974	You Bu x Fu Si No. 4	Rust resistance, good colour at maturity stage	25	19	
Yuan Chung No. 7112	China, 1974	Mo Pa No. 66 x Yuan Nong No. 60	Spring wheat, high yield, short and strong straw (about 70 cm), good tillering, resistant to three kinds of rust	18	15	
Yuan Dong No. 1	China 1979	Gamma rays 25 kR [Zao Yang x Dong Fenhong]	Early maturity, stripe rust resistance, good colour at maturity stage, good quality	25	20	

Yuan Dong No. 772	China, 1977	Gamma rays 25 kR 1972, [11141 x 12040]	Winter wheat, higher yield, good tillering and winter hardiness, early maturity, resistant to stripe rust, white grain colour	18	15
Yuan Dong No. 7848	China, 1978	Gamma rays 25 kR 1973 [12040 x Aurora]	Winter wheat, higher yield, resistant to stripe and leaf rust, early maturity, strong straw, good plant type, white grain colour	18	15
Yuan Feng No. 1	China, 1968	Gamma rays 30 kR [Bi Ma No. 4]	Cold tolerance, lodging resistance, stripe rust resistance	25	18
Yuan Feng No. 2	China, 1968	Gamma rays 30 kR [Bi Ma No. 4]	Cold tolerance, lodging resistance, stripe rust resistance	25	18
Yuan Feng No. 3	China, 1971	Gamma rays 20 kR [A Fu]	Cold tolerance, white grain, good quality	25	18
Yuan Feng No. 4	China, 1978	Gamma rays 30 kR [Tai Shan No. 1]	Short straw, lodging resistance, higher yield	25	19
Yuang Nong No. 53	China, 1970	Gamma rays 15 kR, 1967 [Yuang Nong No. 39 x Orefen]	Spring wheat, higher yield, resistant to three kinds of rust, growth period about 90 days, 110 cm height, suitable for northern China spring wheat region	18	14
Yuang Nong No. 61	China, 1971	Gamma rays 20 kR 1967 [Yuang Nong No.39 x Orefen]	Spring wheat, higher yield, resistant to three kinds of rust, 90 cm height, suitable for northern China spring wheat region	18	14

Name of new variety	Place and date of release (or approval)	Kind and date of mutagenic treatment [treated variety, line, clone...] or mutant crosses (mutant underlined)	Main improved attributes of variety	Reference MBNL Issue	Page	other
Yun Fuzao	China, 1980	Gamma rays 30 kR [(Feng Chen No. 2 x Bi Ma No. 4) x Nan Da 2419]	Early maturity, disease resistance, fits well for cotton/wheat rotation	25	20	
Yu Yuan No. 1	China, 1979	Gamma rays 35 kR [F_2 (St2422/464 x Nei Xiang No. 5)]	Early maturity, lodging resistance, drought and salt tolerance, dry and hot wind tolerance	25	19	
Zenkouzi-Komugi	Japan, 1969	Gamma rays, 1959 [Igachikugo-Oregon]	Earlier maturity (1 or 2 days), shorter culm (15-20 cm), higher yield (10-15%)			IAEA, 1974
Zheng Liufu	China, 1979	Gamma rays 30 kR (twice) [Zheng Zhou No. 6]	Drought tolerance, stripe rust resistance	25	20	
79p-17	China, 1980	Beta rays 10 uc/grain [Chuan Yu No. 5]	Early maturity, disease resistance, tolerance to humidity	25	20	
092	China, 1966	Gamma rays 20 kR [Nan Da 2419]	Early maturity, higher yield, stripe and stem rust resistance, lodging resistance	25	17	
1161	China, 1966	Gamma rays 30 kR [Nan Da 2419]	Cold tolerance, stripe rust resistance	25	18	

Triticum turgidum ssp. durum Desf.

Attila	Austria, 1980	Adur x mutant of [Capelli]	Short culm, lodging resistant, high yield high TKW and yellow pigment	16	18	
Augusto	Italy, 1976	(Castelporziano x Lakota) x Castel del Monte	Increased yield, lodging resistance	10	14	
Cargidurox	France, 1981	EMS, 1970 [K6800707]	Shorter culm, better lodging resistance	21	17	
Castel del Monte	Italy, 1969	Fast neutrons [Garigliano]	Lodging resistance, high yield			IAEA, 1974
Castelfusano (CP C48)	Italy, 1968	Thermal neutrons $1.05 \times 10^{13}/cm^2$ 1956, [Cappelli]	Lodging resistance, yielding ability			IAEA, 1974
Castelnuovo	Italy, 1971	X-rays 4 kR, 1958 [Garigliano]	Lodging resistance, yielding ability, good adaptability			IAEA, 1974
Castelporziano (CP B132)	Italy, 1968	Thermal neutrons $8.38 \times 10^{12}/cm^2$ 1956, [Cappelli]	Lodging resistance, yielding ability			IAEA, 1974
Creso	Italy, 1974	(CP B144 x /Yt54-N10B x Cp^2-63/) x Tc3 (CP B144 = mutant induced in [Capelli] by 20 kR x-rays)	Improved lodging resistance, yielding ability, leaf rust resistance, kernel quality and test weight	6	14	
G-0367	Greece, 1970	Thermal neutrons 12.5×10^{12} cm^2 1963 [YG 3688]	Short culm, resistant to lodging, excellent quality	16 18	18 15	

Name of new variety	Place and date of release (or approval)	Kind and date of mutagenic treatment [treated variety, line, clone...] or mutant crosses (mutant underlined)	Main improved attributes of variety	Reference MBNL Issue	Reference MBNL Page	Reference other
Grandur	Austria, 1980	Adur x Castelporziano	Short culm, lodging resistant, high TKW, high yield	16	18	
Lozen 76	Bulgaria, 1982	(788 x Castelporziano) x Castelporziano (cross with irradiated pollen)	Good yield, lodging resistance and grain quality	20	18	
Mida	Italy, 1974	(CP B144 x /Yt54-N10B x Cp^2-63/) x Tc3 (CP B144 = mutant induced in [Capelli] by 20 kR x-rays)	Improved lodging resistance, yielding ability, leaf rust resistance, kernel quality and test weight	6	14	
Probstdorfer Miradur	Austria, 1978	CP B132 x Adur	Higher yield, good lodging resistance	13	20	
Tito	Italy, 1975	Castelporziano x Lakota	Improved lodging resistance yielding ability, stem rust resistance	6	14	
Tulipa sp.						
Estella Rijnveld	The Netherlands, 1954	X-rays [Red Champion]	Flower colour	17	21	
Faraday	The Netherlands, 1949	X-rays, 1936 [Fantasy]	Flower colour	17	21	

Vigna angularis Willd.

Beni-nambu	Japan, 1978	Gamma rays, 1969 [Mombetsu 26]	Early maturing, shorter stem, good seed colour, uniform seed size, high yield	21	17

Vigna radiata L. (Phaseolus aureus Roxb.)

NIAB Mung-28	Pakistan, 1983	Gamma rays 20 krad seeds, [Pak 17]	Early and uniform maturity, high yield	23	21
Pant Moong 2	India, 1982	Gamma rays 10 kR 1976, [ML 26]	Moderately resistant to mungbean yellow mosaic virus, higher yield	23	21
TAP-7	India, 1982	Gamma rays, 1975 [S-8]	5-7 days earlier maturity, fairly tolerant to powdery mildew and leaf spot disease, 23% higher yield than cv.Kopergaon	23	21

Vigna unguiculata L.

V16 (Amba)	India, 1981	dMS, seeds, 1966 [Pusa Phalguni]	Highest yielding variety in India, resistant to fungal and bacterial diseases	25	21
V37 (Shreshtha)	India, 1981	dMS, seeds, 1966 [Pusa Phalguni]	High yield, luxuriant vegetative growth, suitable as green fodder	25	21
V38 (Swarna)	India, 1984	dMS, seeds, 1966 [Pusa Phalguni]	High yield, early maturity synchronous flowering, better quality pods and grain, almost immune to most diseases of the region	25	21

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V240	India, 1984	dMS, seeds, 1966 [Pusa Phalguni]	High yield, resistance to all major fungal, bacterial and viral diseases	25	21	
Weigela Thunb.						
Couleur d'Automne Courtatom	France, 1979	Gamma rays 5 kR, 1972 [La Printemps]	Variegated leaves, turning red in autumn	25	21	
Rubivif Courtavif	France, 1980	Gamma rays 5 kR, 1972 [Bristol Ruby]	Brighter red flower colour, does not turn purple when getting old, better renewal of the shrub by more sprouts	25	21	
Zea mays Mill.						
CE 200	CSSR, 1979	Gamma rays chronic 1968 [synthetic population] selected inbred line Rt 10 used in 3-way cross to establish CE 200 Hybrid	High yield, early maturity (FAO 230), good stalk quality	17	14	

CE 268	CSSR, 1979	Gamma rays chronic 1968 [synthetic population] selected inbred line Rt 58 used in single cross to establish CE 268 Hybrid	Yield, stalk quality, disease resistance (FAO 280) 1980 cultivated on 2000 ha	17	14
CE 330	CSSR, 1979	Gamma rays chronic 1967 [snythetic population] selected inbred line Rt 54 used in modified single cross to establish CE 330 Hybrid	Yield, plasticity, short stalk, stalk quality (FAO 330), 1980 cultivated on 2000 ha	17	14
Ji Dan 101	China, 1974	Ji 63 x Mo 14	Good root, lodging resistance, resistance to leaf spot, good quality	25	22
Lu Yu No. 3	China, 1980	Yuan Wu 02 x Hun Zao No. 4	Disease resistance, higher yield	25	22
Lu Yuandan No. 1	China, 1976	Hun Feng 100 x Va 35	Leaf spot resistance, bigger grain, good quality	25	22
Lu Yuandan No. 7	China, 1981	Hun Feng 100 x Mo 17	Long ear, leaf spot resistance	25	22
Lu Yuan SC No. 4	China, 1976	Gamma rays 30 kR 1971, [Wu SC Early] selected mutant used in cross Yuan Wu No. 2 x Wei Feng	Single cross hybrid, 15-20% higher yield, maturation 80 days, 180 cm height, resistant to lodging, leaf spot, drought, water logging,	19	19
Lu Yuanshan No. 2	China, 1981	(Yuan Wu 02 x Wei Feng 322) x Hun Zao No. 4	Disease resistance, higher yield	25	22
Yuan Lian No. 5	China, 1980	Zi 330 x Yuan Fu 01	Early maturity, leaf spot resistance, suitable for close planting, good quality	25	22

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Yuan 74-751 (inbred)	China, 1974	Gamma rays 25 kR and microwave (8 mm, 60'), 1971, [(Tang Szu Pin Tou x Ye No. 2)]	Good plant type, erect leaf, resistant to leaf spot, good combining ability, "Yuan Lien No. 5" is a single cross hybrid, with this inbred, suitable for Hobei, Honan and Sandong provinces	18	18	
Yuan 79-171 (inbred)	China, 1979	Gamma rays 3 kR pollen, 1976 [inbred "Kung No. 70"]	Short culm (about 140 cm), growth period around 90 days, resistant to leaf spot, good combining ability, the growth period of single-hybrid (79-171 x 79-418) is about 80 days, suitable for Beijing region	18	18	
Yuan 79-418 (inbred)	China, 1979	Fast neutrons (1.2 x 10"/cm), 1976 [A96 x Da Qiu36 x B64]	Growth period around 95 days, resistant to leaf spot, tolerant to water-log, good combining ability, hybrid (79-171 x 79-418) suitable for Beijing region	18	18	
Zhong Yuandan No. 4	China, 1982	Yuan Fu 17 x Hu Zao No.4	Early maturity, resistance to leaf spot, higher yield	25	22	