Table S7 List of typical examples of introgression breeding in crop species.

Plant Spices	Target trait	Genes involved	Progenitor	Description of major gene transmission	References
Wheat	reduced plant height	Reduced height gene 8 (*Rht8*)	Japanese variety Akakomugi	i) The first geographical pathway of the *Rht8* gene (from variety Akakomugi) was from Japan to Italy at the beginning of the 20th century. In the 1950s, Italian short straw varieties, mostly carriers of *Rht8* and were transferred to former Yugoslavia and to South and Central Europe, where they were used for breeding of semi-dwarf winter wheat varieties. ii) The second geographical pathway of *Rht8* (from variety Akakomugi) was from Japan to Italy, from Italy (by derivatives of Akakomugi) to Argentina before and during World War II (1940–45), and from Argentina to Europe and the former Soviet Union after World War II. **Conclusion**: the *Rht8* gene was introgressed into numerous wheat varieties by different breeding programs.	Borojevic& Borojevic
Wheat	reduced plant height	Reduced height gene 1 (*Rht1*) and Reduced height gene 2 (*Rht2*)	Japanese variety Norin 10	The Japanese wheat variety Norin 10 (source of genes *Rht1* and *Rht2*) was transferred from Japan to the United States after World War II, and from the United States to CIMMYT in Mexico. Via the breeding program of CIMMYT, the *Rht1* and *Rht2* genes were distributed all around the world, including Europe. **Conclusion**: the *Rht1* and *Rht2* genes were introgressed into numerous wheat varieties by different breeding programs.	Borojevic& Borojevic
Wheat	Imidazolinone -resistance	Imidazolinone-resistant (*IR*) gene	FS4	The original mutant (FS4) and most of the early released imidazolinone-resistant cultivars carried the resistance trait on the long arm of chromosome 6 in the D genome (renamed *AhasL-D1*) (Anderson et al., 2004; Pozniak and Hucl, 2004). Using backcrossing programs, wheat lines with resistant genes of *AhasL-B1* and *AhasL-A1* were created and multiple-genome resistant cultivars have been developed. **Conclusion**: the *IR* gene was introgressed into numerous wheat varieties by different breeding programs.	Hanson et al.
Maize	high level of lysine and tryptophan	*opaque2*(*o2*)	*opaque2*(*o2*)	The disadvantages of the original *o2* mutant include lower yields and a soft, chalky kernel. Based on the original *o2* mutant, CIMMYT developed a range of hard endosperm *o2* genotypes with better protein quality through selection, which are popularly known as quality protein maize (QPM). This was followed by the large-scale development of QPM germplasm with a wide range of genetic backgrounds, representing tropical, subtropical and highland maize germplasm and involving different maturities, grain color and texture. **Conclusion**: the *o2* gene was introgressed into numerous maize varieties by different breeding programs.	Babu & Prasanna
Rice	Submergence tolerance	*Sub1A*	Indian landrace FR13A	FR13A was from Orissa, India. An international collaborative project evaluated various procedures for submergence screening, in which FR13A had best performance. Thus, it was widely used as source for developing submergence tolerant cultivars and constructing segregating populations for mapping the submergence tolerance gene. Numerous varieties of rice in Asia have been converted to submergence tolerant versions and greatly contribute to	Xu et al.; Septiningsih et al. ; Bailey-Serres et al.

Plant Spices	Target trait	Genes involved	Progenitor	Description of major gene transmission	References
				increased rice production and more stable yields in these regions. Effectiveness in Africa has been verified. It is one the real success stories of international plant breeding in the last decade. **Conclusion**: the *Sub1A* gene was introgressed into numerous rice cultivars by different breeding programs.	
Rapeseed	low erucic acid	Erucic acid genes are located on A8 and C3.	German cultivar Liho	The first low erucic acid rapeseed ORO, derived from a spontaneous mutant of the German spring rapeseed cultivar Liho by Keith Downey, was released in Canada in 1968. Afterwards, many new varieties derived from the source germplasm were developed in Canada, and then spread to other countries. **Conclusion**: the low erucic acid gene was introgressed into numerous rapeseed varieties by different breeding programs.	Delourme et al. Snowdon et al.
Rapeseed	low glucosinolate	Three major recessive genes (names are unknown currently)	Polish variety Bronowski	In 1969, the Polish spring rape variety Bronowski was identified having low glucosinolate content, and this cultivar provided the basis for an international backcrossing programme to introduce this trait into high-yielding erucic acid-free material. The result was the release in 1974 of the first 00-quality spring rapeseed variety, Tower, with zero erucic acid and low glucosinolate content, and thus began the advance of oilseed rape (canola) in the following decades to one of the most important oil crops in temperate regions. **Conclusion**: the low glucosinolate genes were introgressed into numerous rapeseed varieties by different breeding programs.	Snowdon et al.
Soybean	Soybean cyst nematode (SCN) resistance	*rhg1-b*	PI 88788	Roughly 90% of the commercially cultivated soybean varieties marketed as SCN-resistant in the central United States use the *rhg1-b* allele (haplotype), derived from the soybean line PI 88788, as the main SCN resistance locus. **Conclusion**: the *rhg1-b* gene was introgressed into numerous soybean varieties by different breeding programs.	Cook et al.