Agnes Ricroch · Surinder Chopra Shelby Fleischer Editors

Plant Biotechnology

Experience and Future Prospects



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- Ricroch A. (sous la direction) (1998). Végétaux transgéniques : enjeux pour l'environnement et la santé.
 Revue 'POUR' n°159. Ed. L'Harmattan. pp 188.
- Gallais A. & A. Ricroch (2006). Les plantes transgéniques : faits et enjeux. Ed. Quae Collection Synthèses. pp 304.
- Ricroch A., Dattée Y., Fellous M. (sous la direction) (2011). Biotechnologies végétales, environnement, alimentation, santé. Ed. Vuibert. pp 272.

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