



Australian Government

Department of Health and Aged Care
Office of the Gene Technology Regulator

Licence for dealings involving an intentional release of a GMO into the environment

Licence number: DIR 201

Licence holder: The University of Adelaide

Limited and controlled release of wheat and barley genetically modified for yield enhancement

Issued: 8 April 2024

Varied: 29 April 2025

Gene Technology Regulation in Australia

Australia's gene technology regulatory system operates as part of an integrated legislative framework. The *Gene Technology Act 2000* (Cth) and corresponding state and territory legislation form part of a nationally consistent regulatory system controlling activities involving genetically modified (GM) organisms.

This licence is issued by the Gene Technology Regulator (the Regulator) in accordance with the *Gene Technology Act 2000* and, as applicable, corresponding State law.

The Regulator is required to consult with, and take into account advice from, a range of key stakeholders, including other regulatory authorities, on risks to human health and safety and to the environment in assessing applications for dealings involving the intentional release of GM organisms into the Australian environment.

Other agencies that also regulate GM organisms or GM products include Food Standards Australia New Zealand, Australian Pesticides and Veterinary Medicines Authority, Therapeutic Goods Administration, Australian Industrial Chemicals Introduction Scheme and the Department of Agriculture, Water and the Environment. Dealings conducted under any licence issued by the Regulator may also be subject to regulation by one or more of these agencies. It is recommended that the licence holder consult the relevant agency (or agencies) about their regulatory requirements.

Dealings permitted by this licence may also be subject to the operation of State legislation recognising areas as designated for the purpose of preserving the identity of GM crops, non-GM crops, or both GM crops and non-GM crops, for marketing purposes.

Further Information on Licence DIR 201

More information about the decision to issue this licence is contained in the Risk Assessment and Risk Management Plan prepared in connection with the assessment of the application for the licence. This document can be obtained from the [Office of the Gene Technology Regulator \(OGTR\) website](#) or by telephoning the Office on 1800 181 030.

Information about where the GMOs have been planted pursuant to this licence can be accessed on the [OGTR website](#).

Section 1 Interpretations and definitions

1. In this licence:

- (a) unless defined otherwise, words and phrases used in this licence have the same meaning as they do in the Act and the Regulations;
- (b) words importing a gender include every other gender;
- (c) words in the singular number include the plural and words in the plural number include the singular;
- (d) expressions used to denote persons generally (such as “person”, “party”, “someone”, “anyone”, “no one”, “one”, “another” and “whoever”), include a body politic or corporate as well as an individual;
- (e) references to any statute or other legislation (whether primary or subordinate) are a reference to a statute or other legislation of the Commonwealth of Australia as amended or replaced from time to time and equivalent provisions, if any, in corresponding State law, unless the contrary intention appears;
- (f) where a word or phrase is given a particular meaning, other grammatical forms of that word or phrase have corresponding meanings;
- (g) specific conditions prevail over general conditions to the extent of any inconsistency.

2. In this licence:

‘Act’ means the *Gene Technology Act 2000* (Commonwealth) or the corresponding State law under which this licence is issued.

‘Barley’ means plants of the species *Hordeum vulgare* L.

‘Clean’ means, as the case requires:

- (a) in relation to Equipment or a facility, remove and/or Destroy the GMOs; or
- (b) in relation to an area of land specified in this licence as requiring Cleaning:
 - i. Destroy wheat and barley plants, if present, to the reasonable satisfaction of the Regulator, and
 - ii. remove wheat and barley seeds from the soil surface to the reasonable satisfaction of the Regulator.

Note: The intent of removing seeds from the soil surface is to minimise seed dispersal. One method of removing seeds from the soil surface is Tillage, which moves seeds to under the soil. Tillage must be in accordance with condition 42.

‘Contingency Plan’ means a written plan detailing measures to be taken in the event of the unintended presence of the GMOs outside an area that must be inspected. A Contingency Plan must include procedures to:

- (a) ensure the Regulator is notified immediately if the licence holder becomes aware of the event; and
- (b) recover and/or Destroy the GMOs to the reasonable satisfaction of the Regulator; and
- (c) inspect for and Destroy any Volunteers that may exist as a result of the event to the reasonable satisfaction of the Regulator.

‘Destroy’, (or **‘Destruction’**) means, as the case requires, kill by one or more of the following methods:

- (a) uprooting;
- (b) root cutting and shredding/mulching;
- (c) Tillage, but only in accordance with condition 42;

- (d) treatment with herbicide;
- (e) burning/incineration;
- (f) autoclaving;
- (g) milling/hammer milling;
- (h) crushing or grinding of seed;
- (i) burial, but only in accordance with condition 43;
- (j) a method approved in writing by the Regulator.

Note: 'As the case requires' has the effect that, depending on the circumstances, one or more of these techniques may not be appropriate. For example, treatment with herbicide would not successfully kill GM seeds.

'Equipment' includes, but is not limited to, seeders, harvesters, threshers, storage equipment, transport equipment (e.g. bags, containers, trucks), clothing, footwear and tools.

'Extreme Weather' includes, but is not limited to, fires, flooding, cyclones or torrential rain, that could disperse GMOs or affect the licence holder's ability to comply with licence conditions.

'Flowering' is taken to begin when anthers emerge from any plant of the class of plants referred to in a particular condition, and is taken to end when anthers have dried up or dropped off all plants in the class of plants.

'GM' means genetically modified.

'GMOs' means the genetically modified organisms that are the subject of the dealings authorised by this licence. GMOs include live plants and viable seed.

'Inspection Zone' means an area of land extending outwards at least 50 metres from the outer edge of a Monitoring Zone, as shown in Figure 1.

'Isolation Zone' means an area of land extending outwards at least 140 metres from the outer edge of an Inspection Zone, as shown in Figure 1.

'Logbook' means a written or electronic record containing information required to be collected and maintained by this licence and which is able to be presented to the Regulator on request.

'Monitoring Zone' means an area of land extending outwards at least 10 metres from the outer edge of a Planting Area, as shown in Figure 1. If multiple Planting Areas are present in a Site, the Monitoring Zone also includes the areas of land, of any size, between Planting Areas, as shown in Figure 1.

'OGTR' means the Office of the Gene Technology Regulator.

'Personal Information' means information or an opinion about an identified individual, or an individual who is reasonably identifiable:

- (a) whether the information or opinion is true or not; and
- (b) whether the information or opinion is recorded in a material form or not.

'Planting Area' means an area of land where the GMOs and non-GM wheat and barley are intentionally planted and grown pursuant to this licence.

'Plant Material' means any part of the GM or non-GM wheat and barley plants grown at a Planting Area, whether viable or not, or any product of these plants.

'Regulations' means the Gene Technology Regulations 2001 (Commonwealth) or the corresponding State law under which this licence is issued.

'Regulator' means the Gene Technology Regulator.

'Related Species' means durum wheat, rye or triticale plants.

‘Sign off’ means a notice in writing from the Regulator, in respect of an area, that post-Cleaning obligations no longer apply to that area.

‘Site’ means an area of land containing one or more Planting Areas and their joint Monitoring Zone, as shown in Figure 1.

‘Tillage’ means the use of any technique to disturb the soil.

Note: Tillage must be in accordance with condition 42.

‘Volunteers’ means GM or non-GM wheat and barley plants, which have not been intentionally grown.

‘Wheat’ means plants of the species *Triticum aestivum* L. em Thell.

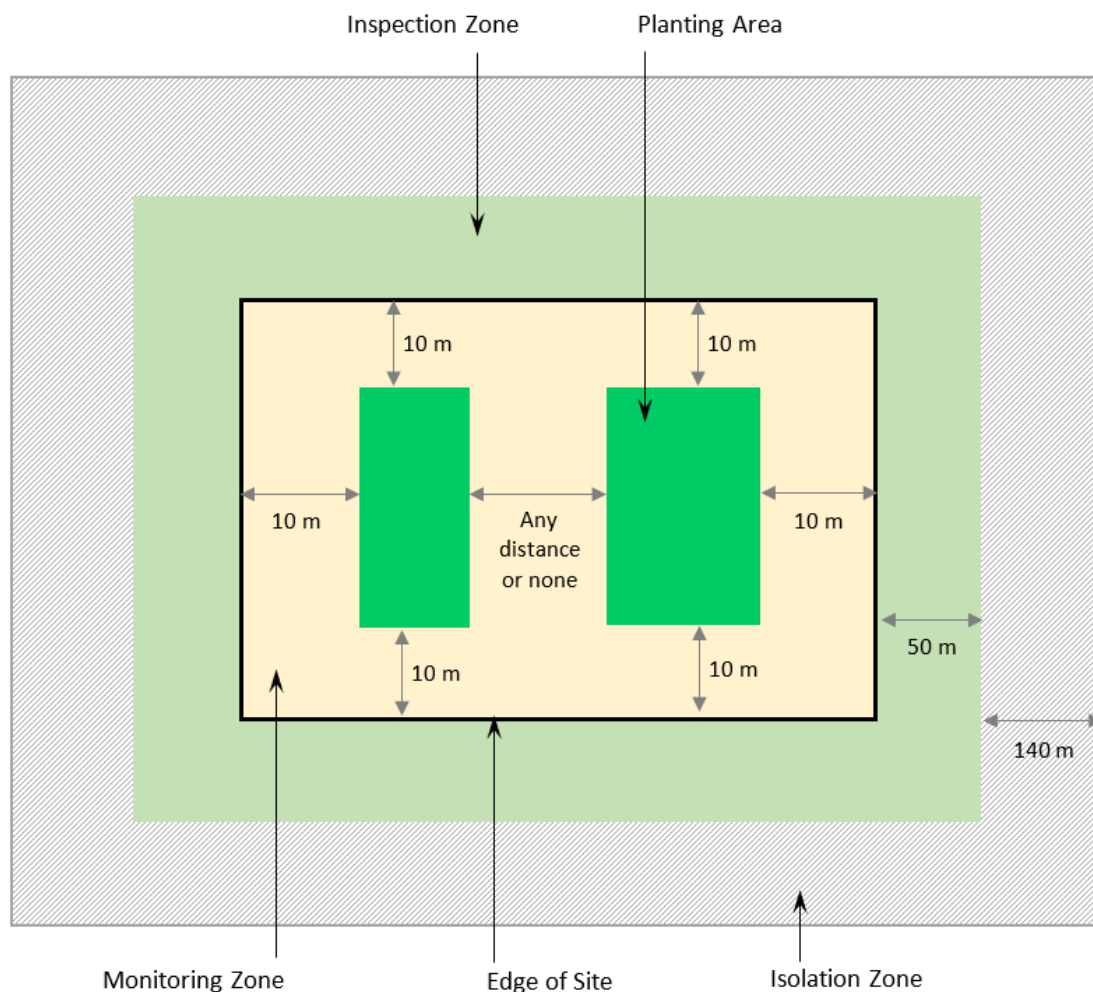


Figure 1. Diagram (not to scale) showing the relationship between Planting Area, Monitoring Zone, Site, Inspection Zone and Isolation Zone.

Section 2 General conditions and obligations

3. This licence does not authorise dealings with the GMOs that are otherwise prohibited as a result of the operation of State legislation recognising an area as designated for the purpose of preserving the identity of GM crops, non-GM crops, or both GM crops and non-GM crops, for marketing purposes.
4. This licence remains in force until it is suspended, cancelled or surrendered. No dealings with the GMOs are authorised during any period of suspension.

Note: Although this licence has no expiry date, the period when GMOs may be grown is restricted in accordance with Condition 19.

5. The licence holder is The University of Adelaide.
6. The persons covered by this licence are the licence holder and employees, agents or contractors of the licence holder and other persons who are, or have been, engaged or otherwise authorised by the licence holder to undertake any activity in connection with the dealings authorised by this licence.
7. The GMOs with which dealings are authorised by this licence are those listed at **Attachment A**.
8. The dealings authorised by the licence are to:
 - (a) conduct experiments with the GMOs;
 - (b) breed the GMOs;
 - (c) propagate the GMOs;
 - (d) grow or culture the GMOs;
 - (e) transport the GMOs;
 - (f) dispose of the GMOs;

and the possession, supply or use of the GMOs in the course of any of these dealings.

9. This licence does not apply to dealings with the GMOs conducted as a Notifiable Low Risk Dealing (NLRD) or pursuant to another authorisation under the Act.

Note: Dealings conducted as an NLRD must be assessed by an Institutional Biosafety Committee (IBC) before commencement and must comply with the requirements of the Regulations.

General obligations of the licence holder

10. The licence holder must, at all times, remain an accredited organisation in accordance with the Act and must comply with its instrument of accreditation.
11. The licence holder must be able to access and control all Planting Areas, Monitoring Zones, Inspection Zones, Isolation Zones and approved facilities to the extent necessary to comply with this licence.

Note: Arrangements to access and control these areas must be notified to the Regulator as part of each planting notification (Condition 51(a)).

12. The licence holder must inform any person covered by this licence, to whom a particular condition of the licence applies, of the following:
 - (a) the particular condition, including any variations of it;
 - (b) the cancellation or suspension of the licence;
 - (c) the surrender of the licence.
13. The licence holder must not permit a person covered by this licence to conduct any dealing with the GMOs unless:
 - (a) the person has been informed of any applicable licence conditions, including any variation of them; and
 - (b) the licence holder has obtained from the person a signed and dated statement that the person:
 - i. has been informed by the licence holder of the licence conditions including any variation of them; and
 - ii. has understood and agreed to be bound by the licence conditions, or variation.
14. The licence holder must inform the persons covered by this licence that any Personal Information relevant to the administration and/or enforcement of the licence may be released to the Regulator.

General obligations of persons covered by the licence

15. If a person is authorised by this licence to deal with the GMOs and a particular condition of the licence applies to the dealing by the person, the person must allow the Regulator, or a person authorised by the Regulator, to enter premises where the dealing is being undertaken, for the purposes of auditing or monitoring the dealing.

Note: Under the Act, the definition of premises includes a building, area of land or vehicle.

Section 3 Limits and control measures

3.1 Limits on the release

The following licence conditions impose limits on where and when the GMOs may be grown.

16. The only plants that may be intentionally grown at a Planting Area are:
- (a) the GMOs covered by this licence; and
 - (b) non-GM wheat and barley plants; and
 - (c) plants approved in writing by the Regulator.
17. Subject to any conditions imposed by the DIR 186 licence, this licence does not prohibit the planting of GMOs authorised under this licence on Planting Areas previously used for DIR 186 or adjacent to Planting Areas concurrently planted under the DIR 186 licence.
18. Non-GM wheat and barley plants grown in a Planting Area must be handled as if they were the GMOs.
19. Planting and growing of the GMOs may only occur within the following limits:

Area and duration

Period	Maximum number of Sites per year	Maximum combined area of Planting Areas per year	Local Government Areas in which Sites may be located
May 2024 - January 2029	1	2 ha	Light Regional Council (SA)

3.2 Control measures

The following licence conditions restrict the spread or persistence of the GMOs and their genetic material in the environment.

GMOs must not enter food or feed

20. Plant Material must not be used, sold or otherwise disposed of for any purpose which would involve or result in its use as food for humans or feed for animals.

Conditions to restrict pollen flow

21. A Planting Area must be surrounded by a Monitoring Zone (as shown in Figure 1). Multiple Planting Areas may be contained within a single Monitoring Zone. No Planting Area may be less than 10 metres from the outer edge of the Monitoring Zone.
22. The Monitoring Zone, with the exception of areas planted in accordance with condition 23, must be maintained in a manner appropriate to allow the identification and Destruction of Volunteers and Related Species while the GMOs are growing in the Planting Areas and until the Planting Areas are Cleaned.

Note: Acceptable measures to achieve this include keeping land free of vegetation or keeping vegetation mown to a height of less than 10 centimetres. Condition 52(d) requires details of current land use and recent land management practices to be recorded upon inspection of the Monitoring Zone.

23. In the Monitoring Zone, the only sexually-compatible plants which may be grown are plants authorised under another licence issued by the Regulator, or plants approved in writing by the Regulator.
24. The Monitoring Zone must be surrounded by an Inspection Zone (as shown in Figure 1).
25. The Inspection Zone must be surrounded by an Isolation Zone (as shown in Figure 1).
26. The GMOs must not be grown in a Planting Area if any crop of wheat and barley or a Related Species is present in the Inspection Zone or Isolation Zone.
27. While the GMOs are growing in a Planting Area, associated areas must be inspected by people trained to recognise wheat and barley and Related Species, and actions must be taken as follows:

Area	Period of inspection	Inspection frequency	Inspect for	Action
Monitoring Zone and Inspection Zone	From 14 days prior to the expected commencement of Flowering of any GMOs* until 14 days after all GMOs in the Planting Area have finished Flowering	At least once every 14 days	Volunteers & Related Species	Destroy before Flowering or prevent from Flowering

**Condition 51(a) requires the licence holder to provide information to the Regulator on the expected Flowering period, however the inspection period should be based on the observed development of the GMOs, so that inspections commence prior to Flowering of any GMOs.*

Note: Details of any inspection activity must be recorded in a Logbook (Condition 52) and reported to the Regulator (Condition 51).

Conditions to restrict seed dispersal

28. Equipment used in connection with the GMOs must be Cleaned as soon as practicable after use with the GMOs and before use for any other purpose.
29. Planting Areas must be at least 50 metres away from any permanent natural watercourses or man-made drainage features that flow into natural watercourses.

Note: This includes irrigation channels or storm water drains that flow into a natural watercourse.

30. Planting Areas must not be located in flood prone areas.
31. Measures must be implemented to control rodents within each Planting Area from at least 7 days prior to planting the GMOs, while the GMOs are being grown and until the Planting Area is Cleaned.

Note: Measures for rodent control may include, but are not limited to, traps and/or poison baits within and/or surrounding the Planting Area.

32. The Monitoring Zone must be maintained in a manner that does not attract or harbour rodents while the GMOs are being grown at a Planting Area and until the Planting Area is Cleaned.

Note: Acceptable measures to achieve this include keeping land free of vegetation or keeping vegetation mown to a height of less than 10 centimetres.

33. If GM plants, other than the GMOs authorised by this licence or those that satisfy condition 16(c),:

- (a) are grown under another licence within the Site at a time when the GMOs authorised by this licence are also being grown; or
- (b) were planted previously on the Planting area and the Planting Area had yet to be signed off; and
- (c) are sexually compatible with the GMOs authorised by this licence;

then seed produced from the GMOs grown under this licence in the Planting Area must not be used for breeding or propagation to produce cultivars for future commercial release, unless it has been determined that the GM seed only contains the expected genetic modifications.

Conditions relating to harvesting

34. GMOs must be harvested or Destroyed within ten months after planting.
35. If all GMOs in a Planting Area have been Destroyed, then for the purposes of this licence:
- (a) the GMOs are taken to have been harvested; and
 - (b) the Planting Area is taken to have been Cleaned.

Note: Cleaning activities must be reported to the Regulator (Condition 51). Areas of land that have been Cleaned are subject to inspections (Condition 40).

36. GMOs must be harvested in a manner that minimises dispersal of GMOs outside the Planting Area.
37. The GMOs must be harvested and threshed separately from any other crop.
38. Harvested GM seed not required for experimentation or future planting must be Destroyed as soon as practicable.

Conditions to restrict persistence of GMOs on trial sites

39. Areas of land used in connection with the GMOs must be Cleaned as follows:

Areas of land to be Cleaned	When
Planting Area	Within 14 days after harvest of the GMOs
Any area, outside a Planting Area, used to Clean any Equipment used in connection with the GMOs	As soon as practicable
Any area, outside a Planting Area, where GMOs have dispersed, e.g. during planting, growing, harvesting or Destruction	As soon as practicable

Note: Cleaning activities must be reported to the Regulator (Condition 51). Areas of land that have been Cleaned are subject to inspections (Condition 40).

40. After Cleaning, areas of land must be inspected by people trained to recognise wheat and barley. Inspections must cover the entirety of areas to be inspected. Actions must be taken as follows:

Area	Period of inspection	Inspection frequency	Inspect for	Action
Planting Area and other areas of land that were Cleaned in accordance with Condition 39.	From the day of Cleaning until: i. the area is planted as a new Planting Area in accordance with Condition 16; or ii. the Regulator has issued a Sign off for the area.	At least once every 35 days	Volunteers	Destroy before Flowering

Note: Details of any inspection activity must be recorded in a Logbook (Condition 52) and reported to the Regulator (Condition 51).

41. While post-Cleaning inspection requirements apply to an area:
- (a) the area must be maintained in a manner appropriate to allow identification of Volunteers; and
 - (b) no plants may intentionally be grown in the area unless:
 - i. the area is planted as a new Planting Area in accordance with condition 16; or

- ii. the plants are planted in accordance with condition 23; or
 - iii. the plants are agreed to in writing by the Regulator; and
- (c) the area must not be used for grazing livestock; and
- (d) prior to an application for Sign off, the area must receive at least three watering events as described in **Attachment B**, at intervals of at least 28 days, with the final required watering event occurring within the six months prior to submission of the Sign off application; and
- (e) within the six months prior to submission of the Sign off application, and before the final required watering event, the area must be Tilled.

Tillage

42. Any Tillage of the Planting Area must be to a depth no greater than five centimetres.

Destruction by burial

43. If Destruction of GMOs occurs by burial:

- (a) the GMOs must be buried in a pit and covered by a layer of soil at least one metre in depth, the top of which is no higher than the surrounding soil surface; and
- (b) seeds must be wet when buried to encourage decomposition; and
- (c) the licence holder must take measures to ensure that the burial site is not disturbed for a period of at least 12 months from the date of burial.

Note: GMOs may be added to the pit over a few weeks prior to covering the pit with a layer of soil, provided measures are taken to ensure that the GMOs do not disperse from the burial pit during this time. If GMOs are dispersed on the soil surface during the process of burial, the burial site becomes an area of land that requires Cleaning under Condition 39 and is subject to post-Cleaning requirements.

Note: The date and location of burial, and measures used to ensure that the burial site is not disturbed, must be reported to the Regulator (Condition 51(f)).

Processing or experimentation with the GMOs

44. Treatment, threshing or processing of GM seed, or experimentation or analysis with the GMOs may only be undertaken within:

- (a) a Planting Area before Cleaning; or
- (b) a facility approved in writing by the Regulator.

Note: This condition does not apply to dealings conducted as an NLRD (see Condition 9).

45. Within a facility approved in writing by the Regulator in accordance with Condition 44, any area that is used for treatment, threshing, processing, experimentation or analysis of the GMOs must be Cleaned as soon as practicable and before use for any other purpose.

Transport or storage of the GMOs

46. Transport or storage of the GMOs must:

- (a) only occur to the extent necessary to conduct the dealings permitted by this licence or other valid authorisation under the Act, or to the extent necessary to enable export of the GMOs; and
- (b) be in accordance with the Regulator's *Guidelines for the Transport, Storage and Disposal of GMOs* for PC2 GM plants as current at the time of transportation or storage; and
- (c) comply with all other conditions of this licence.

Note: Activities with the GMOs within a Planting Area prior to Cleaning are not regarded as transport or storage.

Note: Condition 13 requires signed statements for persons transporting the GMOs.

Note: This condition does not apply to dealings conducted as an NLRD (see Condition 9).

47. Methods and procedures used to transport GMOs must be recorded, and must be provided to the Regulator, if requested.

Note: The Contingency Plan must be implemented if the GMOs are detected outside areas under inspection (Condition 48).

Contingency plan

48. If any unintentional presence of the GMOs is detected outside the areas requiring Cleaning, the Contingency Plan must be implemented.

Section 4 Sign off

49. The licence holder may make written application to the Regulator that planting restrictions and inspection requirements no longer apply to the Planting Area and other areas requiring Cleaning if:

- (a) post-Cleaning inspection activities have been conducted for at least 24 months on the area; and
- (b) conditions have been conducive for germination and detection of Volunteers; and
- (c) no Volunteers have been detected in the area during the six months prior to the Sign off request.

Note: An area requires Tillage and three watering events prior to a Sign off application (Condition 41).

Note: The Regulator will take into account the management and inspection history for the Planting Area and other areas requiring Cleaning, including post-harvest crops planted (if any), Tillage, irrigation, rainfall, application of herbicide and occurrence of Volunteers, in deciding whether or not further inspections are required to manage persistence of the GMOs.

Section 5 Reporting and documentation

The following licence conditions are imposed to demonstrate compliance with other conditions and facilitate monitoring of compliance by staff of the OGTR.

50. General notifications must be sent to the Regulator as follows:

Note: Please send all correspondence related to the licence to OGTR.M&C@health.gov.au.

Notice	Content of notice	Timeframe
a. Changes to contact details	Changes to any of the contact details of the project supervisor that were notified in the licence application or subsequently	As soon as practicable
b. Ongoing suitability to hold a licence	i. any relevant conviction of the licence holder; or ii. any revocation or suspension of a licence or permit held by the licence holder under a law of the Australian Government, a State or a foreign country, being a law relating to the health and safety of people or the environment; or iii. any event or circumstances that would affect the capacity of the licence holder to meet the conditions of the licence; and	As soon as practicable after any of these events occur
	iv. any information related to the licence holder's ongoing suitability to hold a licence, that is requested by the Regulator	Within the timeframe stipulated by the Regulator
c. People covered by the licence	i. names of all organisations and persons, or functions or positions of the persons, who will be covered by the licence, with a description of their responsibilities; and	At least 14 days prior to conducting any dealings with the GMOs (to be updated

	<p><i>Note: Examples of functions or positions are 'project supervisor', 'site manager', 'farm labourer' etc.</i></p> <p>ii. detail of how the persons covered by the licence will be informed of licence conditions</p>	within 14 days if the notified details change)
d. Testing methodology	A written methodology to reliably detect the genetic modifications described in this licence. The detection method/s must be capable of identifying each GM wheat and barley line planted under this licence	At least 14 days prior to conducting any dealings with the GMOs (to be updated within 14 days if the notified details change)
e. Contingency plan	A Contingency Plan to respond to inadvertent presence of the GMOs outside an area that must be inspected	At least 14 days prior to conducting any dealings with the GMOs (to be updated within 14 days if the notified details change)
f. Training records	Copies of the signed and dated statements referred to in condition 13 if requested by the Regulator	Within the timeframe stipulated by the Regulator
g. Additional information required by the Act	<p>i. additional information as to any risks to the health and safety of people, or to the environment, associated with the dealings authorised by the licence; or</p> <p>ii. any contraventions of the licence by a person covered by the licence; or</p> <p>iii. any unintended effects of the dealings authorised by the licence</p> <p><i>Note: The Act requires, for the purposes of the condition 50(g), that:</i></p> <ul style="list-style-type: none"> the licence holder will be taken to have become aware of additional information of a kind mentioned in Condition 50(g) if he or she was reckless as to whether such information existed; and the licence holder will be taken to have become aware of contraventions, or unintended effects, of a kind mentioned in Condition 50(g), if he or she was reckless as to whether such contraventions had occurred, or such unintended effects existed <p><i>Note: Contraventions of the licence may occur through the action or inaction of a person.</i></p>	<p>Without delay after becoming aware of any new information</p> <p><i>Note: An example of notification without delay is contact made within a day of a contravention of the licence via the OGTR free call phone number 1800 181 030. Notification without delay will allow the OGTR to conduct a risk assessment on the incident and attend the location, if required</i></p>
h. Further details regarding additional information	Any further details requested by the Regulator in relation to information provided under condition 50(g)	Within the timeframe stipulated by the Regulator

51. Notifications relating to each trial site must be sent to the Regulator as follows:

Note: please send all correspondence related to the licence to OGTR.M&C@health.gov.au.

Notice	Content of notice	Timeframe
a. Intention to plant	<p>i. Details of the Planting Area including size, the local government area, GPS coordinates, a street address, a diagrammatical representation of the Site (e.g. Google Maps) and any other descriptions</p> <p>ii. Detail of how the licence holder will access and control the Planting Area and the associated</p>	At least 7 days prior to each planting (to be updated as soon as practicable if the notified details change)

Notice	Content of notice	Timeframe
	<p>Monitoring Zone, Inspection Zone and Isolation Zone, in accordance with condition 11</p> <p><i>Note: this should include a description of any contracts, agreements, or other enforceable arrangements.</i></p> <p>iii. Identity of the GMOs to be planted at the Planting Area (e.g. lines or construct details)</p> <p>iv. Date on which the GMOs will be planted</p> <p>v. Period when the GMOs are expected to Flower</p> <p>vi. Period when harvesting is expected to commence</p> <p>vii. How all areas requiring post-Cleaning inspections are intended to be used until Sign off, including proposed post-harvest crops (if any)</p> <p>viii. Details of how inspection activities will be managed, including strategies for the detection and Destruction of Volunteers</p> <p>ix. History of how the Site has been used for the previous two years</p>	
b. Planting	<p>i. Actual date(s) of planting the GMOs</p> <p>ii. Any changes to the details provided under part (a) of this condition</p>	Within 7 days of any planting
c. Extreme Weather	<p>Any Extreme Weather event that is expected to affect or has already affected an area where the GMOs are or may be present.</p> <p><i>Note: The Contingency Plan must be implemented if the GMOs are detected outside areas requiring Cleaning (Condition 48).</i></p>	As soon as practicable
d. Harvest	Actual date(s) of harvesting the GMOs	Within 7 days of commencement of any harvesting
e. Cleaning	<p>i. Date(s) on which required Cleaning was performed on any areas of land</p> <p>ii. Method(s) of Cleaning</p>	Within 7 days of completion of Cleaning
f. Destruction by burial	Date of burial, location of burial including GPS co-ordinates, and details of measures used to ensure that the burial site will not be disturbed for the period required by Condition 43.	Within 7 days of burial of any GMOs
g. Inspection activities	Information recorded in a Logbook as per the inspection requirements (Conditions 27, 40 and 52).	Within 35 days of inspection

Note: Additional records must be provided to the Regulator, if requested, in accordance with condition 47.

52. Details of any inspection activity must be recorded in a Logbook and must include:

- (a) date of the inspections; and
- (b) name of the person(s) conducting the inspections; and
- (c) details of the experience, training or qualification that enables the person(s) to recognise wheat and barley and/or Related Species, if not already recorded in the Logbook; and
- (d) details of areas inspected including current land use (including any post-harvest crops) and recent management practices applied; and

Note: management practices include Tillage events, spraying or maintenance measures used to facilitate inspections.

- (e) details of the developmental stage of the GMOs while they are being grown; and
- (f) details of any post-Cleaning rainfall events including measurements at or near the area, or any irrigation events; and
- (g) details of any Volunteers and/or Related Species observed during inspections or during land-management activities, including number, developmental stage and approximate position of the Volunteers and/or Related Species within each area inspected[†]; and
- (h) date(s) and method(s) of Destruction of or preventing Flowering of any Volunteers and/or Related Species, including destruction of Volunteers and/or Related Species during land-management activities; and
- (i) details of rodent control methods used and any evidence of rodent activity, while rodent control methods are required.

[†] *Examples of acceptable ways to record the positional information for Volunteers and/or Related Species in the Logbook include:*

- *descriptive text*
- *marking on a diagram*
- *indicating grid references on a corresponding map/sketch.*

Note: Details of inspection activities must be provided to the Regulator (Condition 51). The Regulator has developed a standardised proforma for recording inspection activities. This can be made available on request.

DIR No: 201

Full Title: Limited and controlled release of wheat and barley genetically modified for yield enhancement

Organisation Details

The University of Adelaide

IBC Details

IBC Name: The University of Adelaide Institutional Biosafety Committee

GMO Description

GMOs covered by this licence

Wheat and Barley plants genetically modified by introduction or knockout of only the genes and genetic elements listed below.

Parent Organism

Common Name: Wheat and Barley

Scientific Name: *Triticum aestivum* L. and *Hordeum vulgare* L.

Modified traits

Category: Yield enhancement
Abiotic stress tolerance
Altered plant morphology

Selectable markers – antibiotic resistance, herbicide tolerance, visual marker

Description: The licence holder is authorised to release up to 103 lines of wheat and barley genetically modified for yield enhancement.

Altered traits, parent organism, and the type of genetic modification are listed in Table 1. Genes that have been introduced or knocked-out in the GM wheat and barley are listed in Table 2. The introduced regulatory sequences permitted in the GM wheat and barley are listed in Table 3.

GM wheat and barley plants may be crossed.

Table 1. Groups of introduced or knockout genes in the GM wheat and barley

Group	Altered trait	Parent organism	Type of genetic modification
1	Direct yield enhancement	Wheat	Gene introduction
2	Yield enhancement via water use efficiency	Wheat	Gene introduction
3	Yield enhancement via altered spikelet development and flowering time	Wheat	Gene knockout
4	Yield enhancement via altered plant architecture and nutrient use efficiency	Barley	Gene knockout

Table 2. List of introduced or knocked out genes in the GM wheat and barley

Group	Element	Source organism	Function
1	<i>AtAVP1</i>	<i>Arabidopsis thaliana</i>	Increased shoot and root biomass, photosynthetic capacity, yield and nutrient use efficiency; increased salinity tolerance
	<i>OsNas2</i>	<i>O. sativa</i>	Increase in shoot biomass, higher numbers of tillers and grain
	<i>OsPSTOL1</i>	<i>O. sativa</i>	Enhanced growth vigour and earlier heading, high yield
2	<i>TaMUTE</i>	<i>T. aestivum</i>	Stomatal development, symmetrical division of guard mother cells
	<i>TaYDA1</i>	<i>T. aestivum</i>	Negatively regulates stomatal development
	<i>TaYDA2</i>	<i>T. aestivum</i>	Negatively regulates stomatal development
	<i>TaOST1</i>	<i>T. aestivum</i>	Regulates stomatal aperture
	<i>TaSLAC1</i>	<i>T. aestivum</i>	Guard cell anion channel
3	<i>ALOG-1</i>	<i>T. aestivum</i>	Spikelet development and flowering time
	<i>PDB-1</i>	<i>T. aestivum</i>	Spikelet development and flowering time
4	<i>HvLBO</i>	<i>H. vulgare</i>	Strigolactone biosynthesis
	<i>HvMAX1a</i>	<i>H. vulgare</i>	Strigolactone biosynthesis
	<i>HvMAX1b</i>	<i>H. vulgare</i>	Strigolactone biosynthesis
	<i>HvMAX1c</i>	<i>H. vulgare</i>	Strigolactone biosynthesis
	<i>HvMAX1d</i>	<i>H. vulgare</i>	Strigolactone biosynthesis
	<i>HvMAX1e</i>	<i>H. vulgare</i>	Strigolactone biosynthesis

Group	Element	Source organism	Function
	<i>HvD53a</i>	<i>H. vulgare</i>	Strigolactone signalling
	<i>HvD53b</i>	<i>H. vulgare</i>	Strigolactone signalling
	<i>HvPIN2</i>	<i>H. vulgare</i>	Root architecture
	<i>HvCEPR1</i>	<i>H. vulgare</i>	Root architecture
Marker	<i>hptII</i>	<i>Escherichia coli</i>	Hygromycin resistance gene encoding hygromycin phosphotransferase
	<i>nptII / KanR</i>	<i>E. coli</i> K12	Neomycin phosphotransferase gene for resistance against geneticin or kanamycin
	<i>bla / AmpR</i>	<i>Bacillus subtilis</i>	Beta lactamase gene for resistance against ampicillin (for bacterial selection)
	<i>bar</i>	<i>Streptomyces hygroscopicus</i>	Bialaphos resistance gene encoding phosphinothricin N-acetyltransferase (PAT) protein that confers tolerance to glufosinate
	<i>pporRFP</i>	<i>Porites porites</i>	Red fluorescent protein
	<i>Lac operon</i>	<i>E. coli</i>	Controls lactose metabolism (visual marker for bacterial selection)
CRISPR/Cas9 genetic element (Group 3 and 4 GMOs)	<i>Cas9</i> ± FLAG tag	<i>Streptococcus pyogenes</i>	RNA-guided nuclease
Single guide RNA (Group 3 and 4 GMOs)	sgRNA	<i>T. aestivum</i> <i>H. vulgare</i>	RNA-guide for genes in Group 3 and 4

Table 3. Introduced regulatory sequences in the GM wheat and barley

Element function	Genetic element	Source organism
Constitutive promoter	<i>CaMV35S</i> <i>Ubi</i> <i>OsAct1</i> <i>PvUbi1+3</i> <i>OsUbi1</i>	Cauliflower mosaic virus <i>Zea mays</i> <i>Oryza sativa</i> <i>Panicum virgatum</i> <i>O. sativa</i>
RNA promoter	<i>TaU6a</i> <i>OsU6a</i> <i>OsU6b</i> <i>OsU6c</i> <i>OsU3</i> <i>SbU6-2</i> <i>SP6</i> <i>T7</i>	<i>T. aestivum</i> <i>O. sativa</i> <i>O. sativa</i> <i>O. sativa</i> <i>O. sativa</i> <i>Sorghum bicolor</i> <i>E. coli</i> <i>E. coli</i>

Element function	Genetic element	Source organism
Amplification promoting sequence	<i>Ubi1 Intron</i> <i>Ubi 5' UTR</i> <i>CAT-1 intron</i>	<i>Z. mays</i> <i>Z. mays</i> <i>Ricinus communis</i>
Guide RNA scaffold		<i>S. pyogenes</i>
3' regulatory element	Polyadenylation sequence	Cauliflower mosaic virus
Termination sequence	<i>CaMV35S</i> <i>nos</i> <i>OCS</i> <i>Poly (T) motif for termination of gRNA expression</i> <i>rrnB T1</i> <i>rrnB T2</i>	Cauliflower mosaic virus <i>Agrobacterium tumefaciens</i> <i>A. tumefaciens</i> <i>E. coli</i> <i>E. coli</i>

A watering event is irrigation or natural rainfall that provides sufficient soil moisture to promote germination of wheat and barley seeds on a trial site.

Examples of acceptable watering events are:

- At least 26 millimetres of rainfall over one day; or
- At least 28 millimetres of rainfall over two days; or
- At least 30 millimetres of rainfall over three days; or
- At least 32 millimetres of rainfall over four days; or
- Irrigation that provides equivalent levels of soil moisture to one of the examples of rainfall above.

Rainfall measurements must be taken on the site or within 3 km of the site. An irrigation or natural rainfall that matches one of the examples listed above, and occurs during the time period specified for a watering event in Condition 41 of the licence, is considered a valid watering event. The licence holder should keep records of the date/s and amount of water applied during the watering event, and provide this information when requesting Sign off of the relevant site.

If an irrigation or natural rainfall does not match one of the examples listed above, the licence holder may submit a request to the Regulator for it to be considered a watering event. The request should provide:

- evidence of amount of water applied, such as rainfall measurements on the site or within 3 km of the site, and
- evidence that resultant soil moisture is suitable for germination, such as photos of germinating plants on the site.

It is recommended that any requests that an irrigation or natural rainfall be considered a watering event be submitted at the time of the event, to minimise potential delays to Sign off of the site.