

## CICA1521: a new desi variety for the northern region

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### Key words

chickpea variety, desi, yield, disease resistance, Ascochyta blight, Phytophthora root rot, phenology, grain quality

### GRDC code

DAN00094, DAN00151, DAN00176, DAN00212, BLG205, BLG209, BLG111, 9177999

### Take home message

A new broadly adapted desi chickpea variety for the northern region and other chickpea growing areas of Australia, will be launched in spring 2020. The variety was evaluated as CICA1521 (to be named) and has higher yields in northern NSW and southern QLD than PBA HatTrick<sup>®</sup>. CICA1521 has a medium seed size and is expected to have similar disease ratings to PBA HatTrick<sup>®</sup>.

### Significant yield advantage over PBA HatTrick<sup>®</sup>

CICA1521 has been included in National Variety Trials (NVT) since 2015. During this five-year period there has been a very wet season (2016) and a number of dry seasons (2018 and 2019). CICA1521 has shown great consistency despite the highly variable seasons. It has yielded higher than Kyabra<sup>®</sup>, PBA Boundary<sup>®</sup>, PBA HatTrick<sup>®</sup> and PBA Seamer<sup>®</sup> in south west QLD (Table 1). In north west NSW it has shown consistent yield gains over PBA HatTrick<sup>®</sup> (Table 2).

**Table 1.** Long term yield (2015-2019) of CICA1521 and current chickpea varieties, expressed as a % of the mean yield, in NVT in south west QLD. The mean yield of all varieties in each of the 13 contributing trials was used to assign that trial to a 'yield grouping'. This enables varietal performance to be better evaluated in different yield situations

		Yield group (t/ha)				
		1	1.5	2	2.5	3.5
	Mean yield (t/ha)	0.61	1.34	1.74	2.38	3.05
<b>Variety</b>	No trials in total & for each yield group	2	3	3	2	3
<b>CICA1521</b>	<b>13</b>	<b>112</b>	<b>109</b>	<b>104</b>	<b>107</b>	<b>109</b>
Kyabra <sup>®</sup>	13	96	106	97	101	103
PBA Boundary <sup>®</sup>	13	103	102	101	101	101
PBA Drummond <sup>®</sup>	4	121	115		112	
PBA HatTrick <sup>®</sup>	13	95	97	98	97	96
PBA Seamer <sup>®</sup>	13	103	98	102	100	100

Source: <https://app.nvtonline.com.au/lty/table/chickpea-desi/qld/swq/?lty-type=yield>

**Table 2.** Long term yield (2015-2019) of CICA1521 and current chickpea varieties, expressed as a % of the mean yield, in NVT in north west NSW. The mean yield of all varieties in each of the 25 contributing trials was used to assign that trial to a 'yield grouping'. This enables varietal performance to be better evaluated in different yield situations

		Yield group (t/ha)					
		0.5	1	1.5	2	2.5	3.5
	Mean yield (t/ha)	0.41	0.88	1.23	1.84	2.25	2.96
<b>Variety</b>	No trials in total & for each yield group	1	8	4	6	4	2
<b>CICA1521</b>	<b>25</b>	<b>106</b>	<b>110</b>	<b>110</b>	<b>107</b>	<b>107</b>	<b>105</b>
Kyabra <sup>Ⓟ</sup>	25	140	115	107	92	94	80
PBA Boundary <sup>Ⓟ</sup>	25	114	108	104	99	99	92
PBA Drummond <sup>Ⓟ</sup>	6	98	113	116	115		
PBA HatTrick <sup>Ⓟ</sup>	25	105	99	97	96	96	93
PBA Seamer <sup>Ⓟ</sup>	25	83	95	98	104	103	109

Source: <https://app.nvtonline.com.au/lty/table/chickpea-desi/nsw/nw/?lty-type=yield>

### Ascochyta blight

CICA1521 has undergone Ascochyta blight (AB) testing in the field at Tamworth and Horsham as well as single isolate testing under controlled conditions in Adelaide.

CICA1521 was included in an integrated disease management trial for AB conducted at Tamworth in 2017 (Table 3). In this trial CICA1521 had a similar yield loss to PBA Boundary<sup>Ⓟ</sup> and a much lower yield loss than PBA Drummond<sup>Ⓟ</sup> and Kyabra<sup>Ⓟ</sup>. An integrated disease management trial currently being conducted in 2020 will confirm the AB disease management package for CICA1521.

**Table 3.** Yield (t/ha) of CICA1521 and current varieties with and without fungicide control (1.0 L/ha chlorothalonil) and the % of yield loss at Tamworth in 2017

Name	Yield (t/ha)		% yield loss
	1L /ha Chlorothalonil (720 g/L formulation)	Nil fungicide	
<b>CICA1521</b>	<b>1.68</b>	<b>1.58</b>	<b>11</b>
Kyabra <sup>Ⓟ</sup>	1.94	0.21	89
PBA Boundary <sup>Ⓟ</sup>	1.73	1.53	12
PBA Drummond <sup>Ⓟ</sup>	1.87	0.88	53
PBA HatTrick <sup>Ⓟ</sup>	1.67	1.58	6
PBA Seamer <sup>Ⓟ</sup>	1.81	1.68	7
<i>Lsd (P&lt;0.001)</i>	<i>0.211</i>		

An increase in the aggressiveness of the AB pathogen has been observed both in the northern and southern regions (Ford et al., 2018). Increased levels of disease have been recorded on CICA1521 and other varieties such as PBA Seamer<sup>Ⓟ</sup> from these isolates collected in 2017 compared to isolates collected in 2015 (Table 4). The distribution of the more aggressive isolates in the northern region is currently unknown, due to the reduced chickpea area and dry seasons over the past two years,

however a conservative disease rating from the NVT pulse disease rating system for CICA1521 is expected. For northern isolates this is likely to be a Moderately Susceptible rating for Ascochyta blight.

**Table 4.** Mean disease index of chickpea varieties in single isolate AB screening conducted at Adelaide. The index is calculated as the sum of (% main stems broken + % of stems with lesions + % side branches with disease + % leaves with disease) divided by 4. (0 = healthy plant, 100 = heavily diseased plant)

Name	Isolate collection location and year							
	Yallaroi NNSW 2015	Curyo VIC 2015	Graman NNSW 2016	Curyo VIC 2016	Gurley NNSW 2017	Pt Broughton SA 2017	Gurley NNSW 2017	Curyo VIC 2018
<b>CICA1521</b>	<b>40</b>	<b>50</b>	<b>77.1</b>	<b>76.3</b>	<b>29.2</b>	<b>26.7</b>	<b>67.9</b>	<b>89.6</b>
Kyabra <sup>Ⓛ</sup>			100	100	100	100	100	100
PBA Boundary <sup>Ⓛ</sup>	81.3	67.9	100	100	77.1	55.4	90	100
PBA Drummond <sup>Ⓛ</sup>	97.1	100	100	100	66.7	97.5	83.3	100
PBA HatTrick <sup>Ⓛ</sup>	87.5	61.7	86.3	94.2	66.7	48.8	67.9	68.3
PBA Seamer <sup>Ⓛ</sup>	31.7	37.5	83.8	90.8	29.2	39.2	65.4	84.6
<i>Lsd</i>	20.6	27.2	18.1	16.2	24.7	19.2	26.6	28.6

### Phytophthora root rot

CICA1521 was included in Phytophthora root rot (PRR) yield loss trials conducted at Warwick QLD, over several years (Table 5). Yield losses for CICA1521 from PRR in these trials have ranged from 38.7 to 93.4 %. Similar variability in yield loss has also been observed for PBA HatTrick<sup>Ⓛ</sup>; an explanation of the seasonal impacts on yields and varietal PRR disease rankings is provided in Bithell et al., 2018. In 2020, NVT pulse disease rating testing is currently being conducted for PRR for the first time. It is expected that a review of all variety ratings for PRR will be conducted to align with the NVT disease rating definitions.

**Table 5.** Yield (t/ha) in the absence of PRR and yield loss (%) from PRR across 2016 to 2018 for CICA1521 and other current chickpea varieties. Adapted from Bithell et al., 2018, Bithell et al., 2019

Name	2016		2017		2018	
	Yield (t/ha) in the absence of PRR	% yield loss from PRR	Yield (t/ha) in the absence of PRR	% yield loss from PRR	Yield (t/ha) in the absence of PRR	% yield loss from PRR
<b>CICA1521</b>	<b>4.06</b>	<b>75.1</b>	<b>2.74</b>	<b>93.4</b>	<b>1.94</b>	<b>38.7</b>
PBA Boundary <sup>Ⓛ</sup>	3.98	95.2	2.63	82.5		
PBA Drummond <sup>Ⓛ</sup>					2.49	68.1
PBA HatTrick <sup>Ⓛ</sup>	4.02	90.0	3.31	78.2	2.28	40.5
PBA Seamer <sup>Ⓛ</sup>	4.08	76.7	3.23	90.4	2.81	61.5
Yorker	4.06	68.3	3.50	97.3	2.84	40.1

### Phenology and other agronomic traits

CICA1521 is early flowering when sown in the mid-May to mid-June sowing window, approximately six days earlier than PBA HatTrick<sup>Ⓛ</sup> (Table 6). Flowering data collected from early May sown chilling

tolerance trials (BLG111) indicates that CICA1521 can flower up to 24 days earlier than PBA HatTrick<sup>®</sup> depending on winter daytime temperatures. An increased understanding of the drivers of chickpea phenology is expected with a number of new GRDC investments in this area. Although there is some data indicating that CICA1521 may produce pods earlier in some environments (e.g. Kingaroy 2019), it is expected that days to first pod is similar to current varieties.

**Table 6.** Phenology data (2017-2019) collected for CICA1521 and current chickpea varieties from breeding and chilling tolerance trials in northern NSW and southern QLD

Sowing date	Location	CICA1521		Kyabra <sup>®</sup>		PBA Drummond <sup>®</sup>		PBA HatTrick <sup>®</sup>		PBA Seamer <sup>®</sup>	
		DTF	DTP	DTF	DTP	DTF	DTP	DTF	DTP	DTF	DTP
15/6/2017	Spring Ridge	102		103				103		102	
23/5/2018	Moree	91		96		97		98		97	
7/5/2018	Tamworth	101	134	112	134	120	134	125	135	126	134
12/6/2018	Tamworth	96	108	99	108	97	108	102	108	99	
13/5/2019	Narrabri	77	108	83	106			80	108		
15/5/2019	Breeza	106	122	105	123			105	122		
17/5/2019	Kingaroy	79	91	82	95			81	96		

DTF = days to flower from sowing

DTP = days to pod from sowing

CICA1521 has early to mid-maturity, earlier than PBA HatTrick<sup>®</sup>. CICA1521 has an erect plant type with good height to lowest pod and plant height. Under the high biomass producing conditions of 2016, CICA1521 had less lodging than PBA HatTrick<sup>®</sup> at six sites across northern NSW and southern QLD (Table 7).

**Table 7.** Mean lodging score at northern NSW and southern QLD breeding sites in 2016 for CICA1521 and current chickpea varieties. 1 = erect, 9 = flat.

Location	CICA1521	Kyabra <sup>®</sup>	PBA HatTrick <sup>®</sup>	PBA Seamer <sup>®</sup>
Edgeroi	3.7	2.3	5.3	5.3
North Star	4.3	3.0	7	3.3
Rowena	5.3	5.3	6.7	6.3
Warwick	6.0	6.3	6.3	5.3
Warra	3.3	2.0	6.0	2.7
Roma	3.7	3.0	6.0	4.7

In 2019, 30 hectares of CICA1521 at Trangie was harvested by a commercial contract harvester. No negative feedback regarding the harvestability of CICA1521 was reported. Eleven large scale farmer demonstration strips have been sown in 2020 across the northern region. These will provide feedback on the harvestability of CICA1521 with commercial harvesters from a range of growing environments.

### Grain quality

CICA1521 has a yellow-brown seed coat and angular seed shape, not unlike PBA HatTrick<sup>®</sup>. The seed size of CICA1521 is larger than PBA HatTrick<sup>®</sup>, similar to PBA Seamer<sup>®</sup> and PBA Drummond<sup>®</sup> but smaller than Kyabra<sup>®</sup> (Table 8). CICA1521 has a higher or similar split yield than PBA HatTrick<sup>®</sup> and PBA Drummond<sup>®</sup> at six sites across southern QLD and northern NSW.

**Table 8.** Seed size (grams per 100 seeds) and split yield % (SY%) for CICA1521 and other current chickpea varieties at six sites in northern NSW and southern QLD

Site Year	CICA1521		Kyabra <sup>Ⓞ</sup>		PBA Drummond <sup>Ⓞ</sup>		PBA HatTrick <sup>Ⓞ</sup>		PBA Seamer <sup>Ⓞ</sup>	
	100S W	SY%	100S W	SY%	100S W	SY%	100S W	SY%	100S W	SY%
Roma 2017	19.8	52.9	21.9	72.5			20.1	40.8	20.8	44.8
Spring Ridge 2017	22.5	53.2	24.6	45.1			18.9	44.3	21.3	55.7
Warra 2017	21.7	72.3	24.2	67.5			22.5	70.5	24.1	73.7
Moree 2018	21.5	41.2	25.1	46.9	22.2	36.7	20.2	42.9	21.5	42.0
North Star 2018	23.7	46.0	27.2	64.1	24.0	39.7	22.0	39.2	23.5	45.3
Warra 2019	22.3	50.7	24.2	32.6	22.4	38.0	21.8	37.4	22.2	38.7

100SW = grams per 100 seeds

SY% = split yield % (yield of dhal using a standard SKE milling method without pre-conditioning seeds; Wood et al 2008).

### Commercialisation and seed availability

NSW DPI are commercialising CICA1521 through several seed partners in the northern region. In 2020, there are five multiplication crops of CICA1521 throughout northern NSW and southern QLD. Further details regarding the seed partners will be made available in spring when the variety is launched.

### Acknowledgements

CICA1521 was developed by the PBA Chickpea program (led by NSW Department of Primary Industries). The partners of the PBA Chickpea program were: GRDC, NSW DPI, Department of Agriculture and Fisheries (QLD), Agriculture Victoria and the South Australian Research and Development Institute.

The research undertaken as part of this project is made possible by the significant contributions of growers through trial cooperation and the co-investment of the GRDC. The authors would like to thank them for their continued support.

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