



# A response tyne for site-specific fallow weed control



Andrew Guzzomi (UWA), Carlo Peressini (UWA), Michael Walsh (USyd)



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# The challenge

## Glyphosate resistance

- Fleabane
- Sowthistle
- Barnyard grass
- Feathertop Rhodes grass



**Glyphosate is cheap but  
resistance is forever**

# The challenge

- Glyphosate reliance
- Up to five applications per season

## Whole paddock

Weed density > 1.0plant/10m<sup>2</sup>



## Site-specific

Weed density < 1.0plant/10m<sup>2</sup>



# The beginning



**“Weed kicking”**



**Hydraulic breakout**

# The aim

Selectively target weeds in fallow

Weed density of 1.0 plant/10m<sup>2</sup>

Operating at 10 km/h

Minimal soil disturbance

Economical

# The Approach

## Retrofit Shearer Trashworker



### ADVANTAGES

- Potential to recycle existing cultivators
- Limit farmer investments
- Timely development

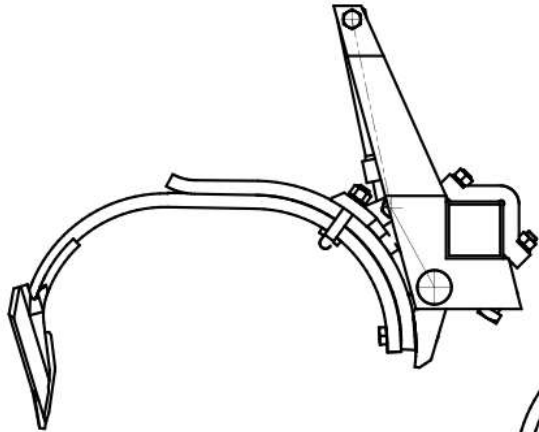
### OUTSIDE ORIGINAL SCOPE

- High mass and inertia of moving components
- Geometric constraints
- Hydraulic system

# How to use the hydraulic breakout for weed chipping?

CLOSED POS.

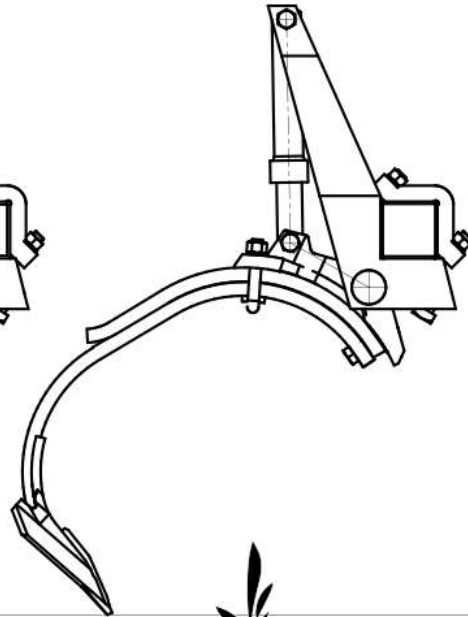
(C)



SOIL LINE

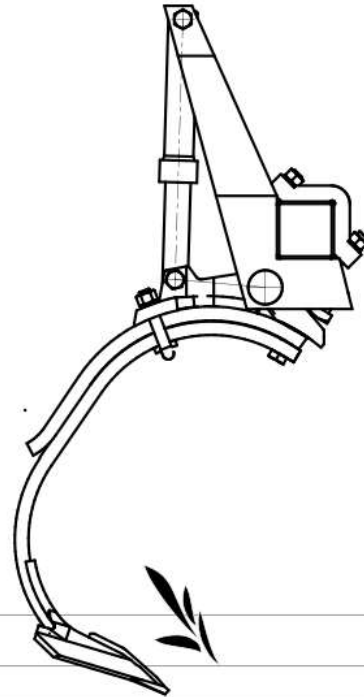
STAND-BY POS.

(S)



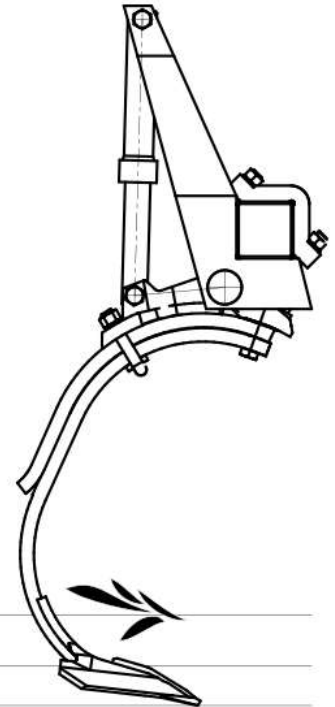
MAX TORQUE POS.

(T)



BOTTOM POS.  
(PHYSICAL STOP)

(B)

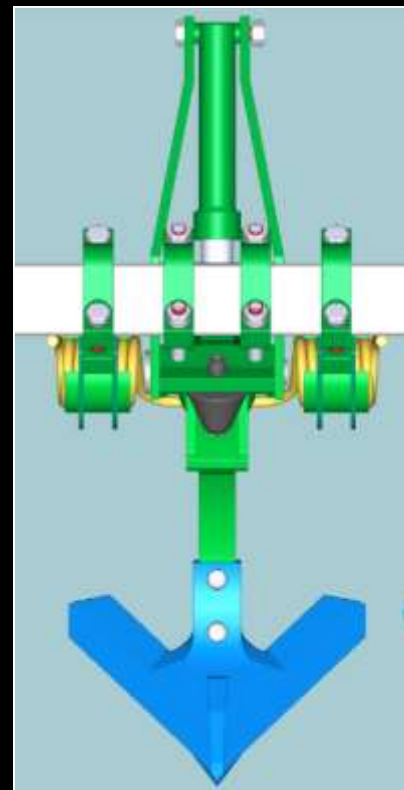
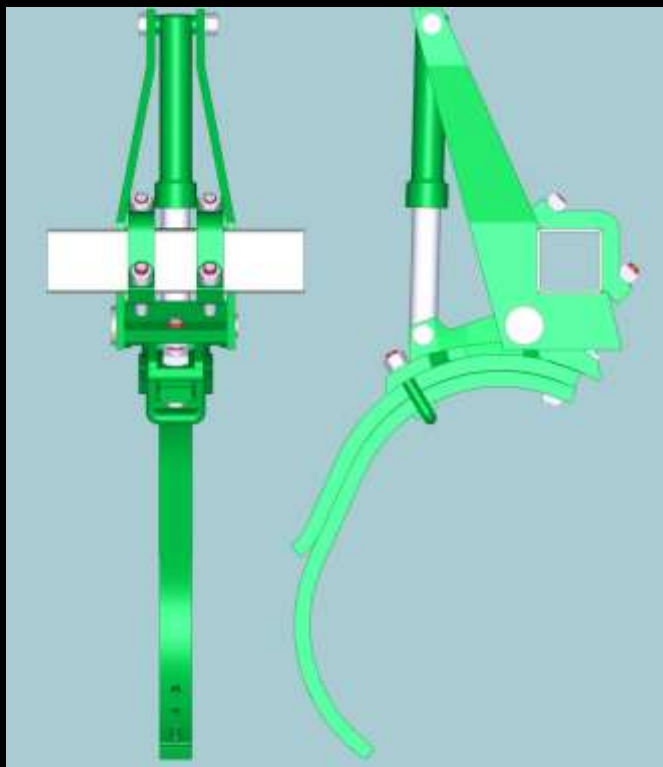


SOIL LINE

3" 4"



## How to use the hydraulic breakout for weed chipping:



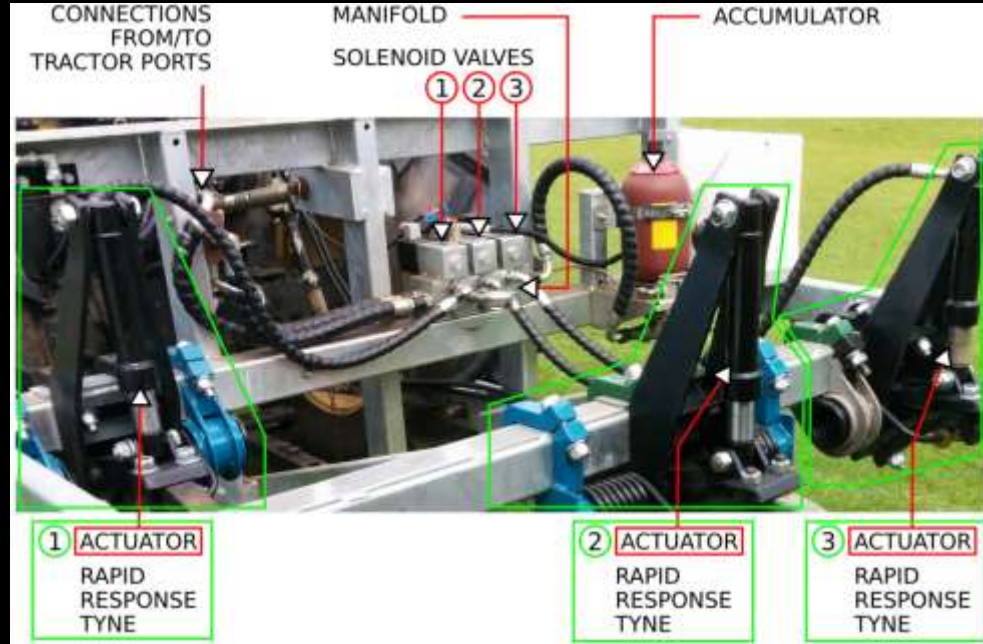
# How to use the hydraulic breakout for weed chipping:

## Modular system

CONTROL  
UNIT



HYDRAULIC SYSTEM



SPRING SYSTEM

4-BAR MECHANISM

SWEEP SERIES

# The test phase

**UWA Perth**



**Engineering  
design and testing**

**USYD Narrabri**



**Field testing**

**QDAF Toowoomba**



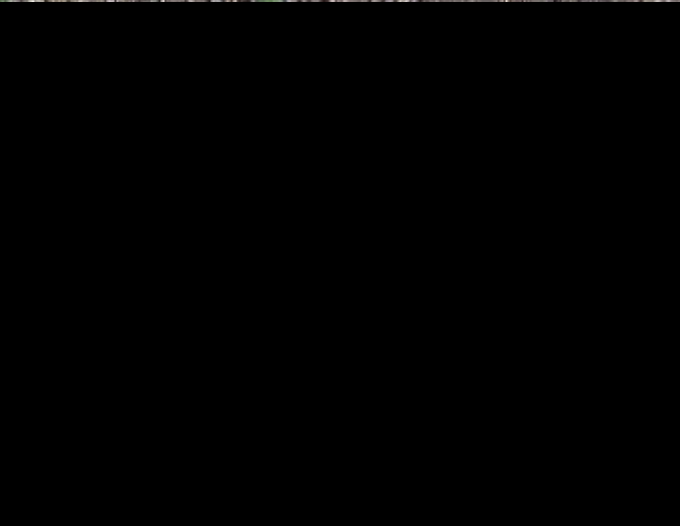
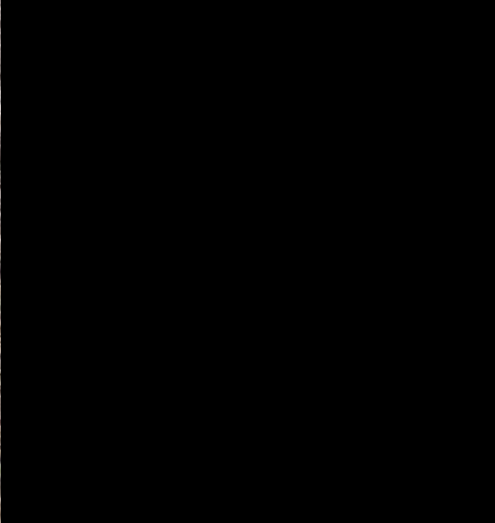
**Field testing**

# The test phase

**Table 1. Response tyne efficacy on four winter weed species at eight growth stages, Narrabri NSW 2017**

Plant size	Wild oats		Turnip weed		Sowthistle		Annual ryegrass	
	Control (%)							
	Direct* contact	Partial contact	Direct contact	Partial contact	Direct contact	Partial contact	Direct contact	Partial contact
1-2 leaf	100	0	100	100	100		100	0
3-4 leaf	100	-	100	0	100	-	100	0
6-8 leaf	100	-	100	100	100	-	100	0
10-12 leaf	100	0	100	-	100		100	0
Early-tillering/20 cm diameter	100	0	100	-	100	-	100	0
Mid-tillering/30 cm diameter	100	0	100	-	100	-	100	0
Late-tillering/40cm diameter	100	0	100	-	100		100	0
Anthesis/40-50cm diameter	100	-	100	-	100	-	100	0

\* Direct contact is when point of tyne directly contacted centre of weed tap root or root ball



# The test phase

**Table 3. Response tyne efficacy on three summer weed species at three growth stages, Gatton and Hermitage, Qld**

Summer 2016/2017	Weed size	Barnyard Grass	Feathertop Rhodes Grass	Windmill Grass
		Control (%)		
Gatton Research Farm	10-20cm diameter	100	94	100
	20-40cm diameter	96	91	100
	40-60cm diameter	99	87	96
Hermitage Research Farm	10-20cm diameter	98	78	100
	20-40cm diameter	92	33	100
	40-60cm diameter	83	8	.

. Indicates that established weeds were either missed by the tyne (alignment issue) or the tyne did not activate

**Table 2. Response tyne efficacy on two winter weed species at three growth stages, Gatton Qld**

Weed Size	Oats	Sowthistle
	Control (%)	
5-10cm diameter	.	100
10-20cm diameter	100	85
20-40cm diameter	98	75

. Indicates that established weeds were either missed by the tyne (alignment issue) or the tyne did not activate

# Extension and validation

- Grower meetings and crop updates presentations
- Sweep design
- Fatigue/wear testing
- Commercial scale field validation



# Acknowledgements

- HWSC brains trust: Ray Harrington, Rod and Andrew Messina, Lance Turner
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