Leaf Wall Area Calculations

To obtain leaf wall area (LWA) calculations in ARM, the below fields must be filled.

The examples given use the standard ARM study definition 'G-All7'. A majority of the corporate customizations also support Leaf Wall Area calculations, either entered manually or calculated automatically, and require the same information in similar fields.

- **Crop Row Spacing** (found on the Crop Description tab)
- ***Row Sides Applied** (found on the Application Equipment tab)
    - Some interpretations of LWA applications assume that *both* row sides are *always* treated, so some corporate customizations do not include Row Sides Applied. The calculation formula for these customizations always calculates for 2 row sides.
- ***Treated Canopy Height** (found on the Crop Stage at Appl tab)

*Note: These values must be entered into all applications in a trial for which LWA should be calculated.

From the information listed above, Leaf Wall Area is calculated into a read-only field on the Crop Stage at Appl tab for the given application. The value will automatically recalculate if any of the above values are changed.

Crop Stage At Each Application

	A		B	
Application Date:	Apr-2-2018		Apr-12-2018	
Treated Canopy Height, Unit:	2	m	2.5	m
Treated Leaf Wall Area, Unit:	12903	m2/ha	16129	m2/ha
Treated LWA Formula:	2*2*10000/3.1		2*2.5*10000/3.1	
Treated LWA per Plot, Unit:	50	m2/plot	63	m2/plot

The Treated LWA Formula field displays the calculation that is used:

Treated Leaf Wall Area = Row Sides Applied * **Treated Canopy Height** (in m) * 10000 / **Row Spacing** (in m)

Application Plan

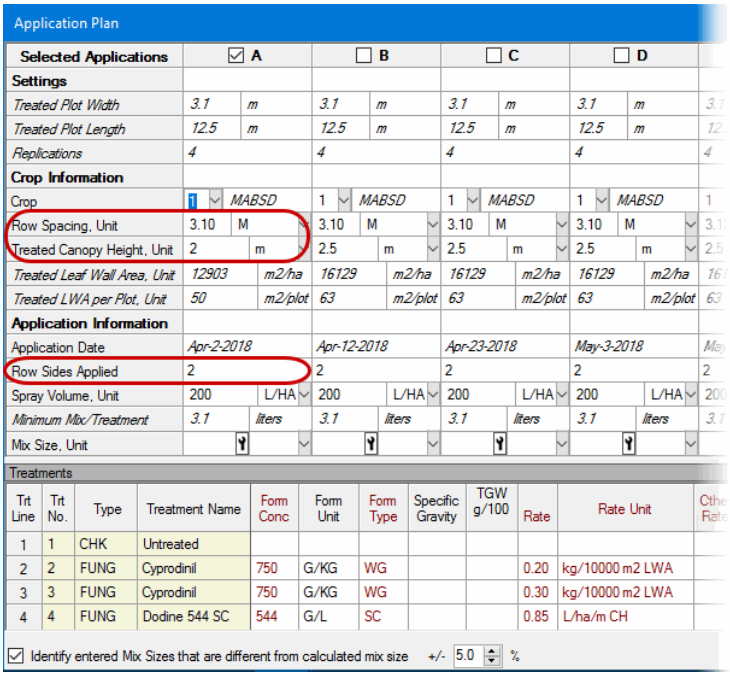
The Application Plan dialog summarizes key information related to each application of a study. This is especially useful when working with Leaf Wall Area applications. All fields involved in the LWA calculation are included on the Application Plan.

Changes made on this dialog are saved to the respective fields in the Site Description.

The Treatments table lists treatment lines containing application codes for one or more of the "Selected Applications". This table view is only for reference, so cannot be modified.

This dialog can be accessed from:

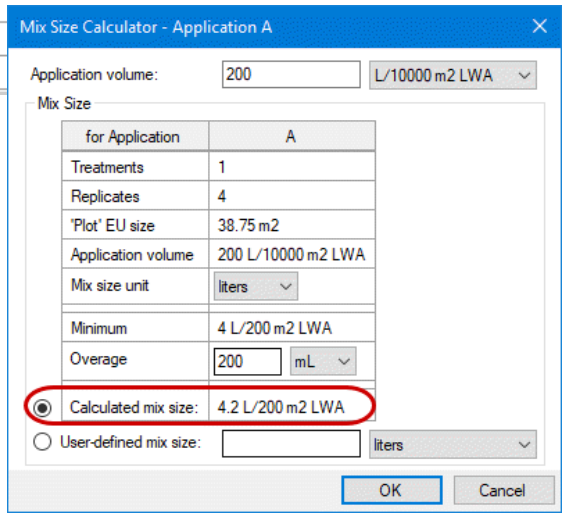
- Treatments Properties Panel
- Site Description Properties Panel
- Settings Dialog - Application Tab
- When printing the Spray Plan report with the option 'Show Application Plan' selected



Mix Size

The Treated Leaf Wall Area is used to calculate the Mix Size in applications using the "L/10000 m2 LWA" Application Amount Unit. The total mix required to treat the entire Leaf Wall Area plus overage is entered in the Mix Size field. As the Treated Canopy Height and LWA increases for each application, the Mix Size increases:

Treated Canopy Height, Unit	2	m	2.5	m
Treated Leaf Wall Area, Unit	*12903*	*m2/ha*	*16129*	*m2/ha*
Row Sides Applied	2		2	
Spray Volume, Unit	200	L/10000 m2 LWA	200	L/10000 m2 LWA
Minimum Mix/Treatment	*4*	*liters*	*5*	*liters*
Mix Overage, Unit	200	mL	200	mL
Mix Size, Unit	4.2	liters	5.2	liters



Press F9 or select the Tools button in the Mix Size field to display the **Mix Size Calculator**. The Treated Leaf Wall Area per treatment is shown in the Calculated Mix Size unit to identify when it was multiplied by the LWA factor. Select either:

- Calculated Mix Size, which is based on treated area plus the specified overage value,
- User-defined mix size - be certain the entered value is appropriate.

Click OK on the Mix Size Calculator to save selected changes back to the Site Description and Settings.

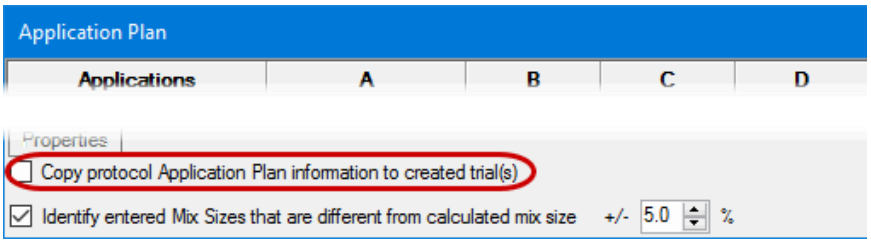
LWA in a protocol

Leaf Wall Area is not calculated automatically in an ARM protocol. This is because the values needed for the LWA calculation are often either estimates or are unknown.

An **estimate** can be entered in the Treated Leaf Wall Area field on the Protocol Description – Crop Stage at Appl. tab. Press F9 in the Treated Leaf Wall Area field to display a list of common estimated LWA values for various crops. Select an estimated LWA from the list, or use the list as a reference to compare against a manually entered LWA. The estimated Treated Leaf Wall Area is used to adjust product amount calculations on the Protocol Spray/Seeding Plan report. This estimate is automatically replaced with the calculated Treated Leaf Wall area in any created trial.

If a protocol contains multiple applications, application estimates only need to be entered in application A. When application information is blank in applications B-Z, ARM uses the estimates entered in application A when calculating product amounts. This feature will only occur in a protocol.

Entries on the Application Plan dialog in the protocol are only copied to a created trial if option to "Copy protocol Application Plan information to created trial(s)" is selected. Clear this option when field entries on the protocol Application Plan are only estimates, and the trialist should fill trial entry fields with the actual information.



Adjusting product amount calculations for LWA

ARM can adjust product amount calculations to include leaf wall area, on the Spray/Seeding Plan and Product Amount Totals reports.

The product amount calculations are multiplied by the LWA factor, which is the total Treated Leaf Wall Area divided by 10000 m2. In this example (LWA trial in the tutorial folder), the LWA factor is 12903/10000=1.2903.

Reps: 4 Appl Code: A Plots: 3.1 by 12.5 meters Treated LWA per Plot: 50 m2/plot
Spray vol: 200 L/ha Mix Size: 3.5 L/200 m2 LWA (total for 4 plots, includes 400 mL overage)

Trt No.	Treatment Name	Form Conc	Form Unit	Form Type	Rate	Rate Unit	Appl Code	Amt Product to Measure	Rep 1	2	3	4
2	Cyprodinil	750	G/KG	WG	0.20	kg/10000 m2 lwa	A-I	4.516 g/mx	102	206	312	408
3	Cyprodinil	750	G/KG	WG	0.30	kg/10000 m2 lwa	A-I	6.774 g/mx	101	204	308	401
4	Dodine 544 SC	544	G/L	SC	0.85	l/ha/m ch	A-I	29.75 mL/mx	106	209	307	412
5	Syllit	400	G/L	SC	2.88	l/10000 m2 lwa	A-I	65.03 mL/mx	108	211	302	405
6	Syllit	400	G/L	SC	3.75	l/10000 m2 lwa	A-I	84.68 mL/mx	111	203	310	402

- The 'Treated LWA Per Plot' is included in the heading when LWA calculations are used. The formula is: LWA per Plot = Row Sides Applied * Treated Canopy Height * Plot Length * Plot Width / Crop Row Spacing.
- The Mix Size is entered as the total mix to treat the calculated leaf wall area of the crop (including any specified overage) per treatment.

There are two scenarios where this adjustment occurs:

Scenario 1: Using an LWA Rate

- An LWA Rate Unit is selected for the treatment line,

Form Conc	Form Unit	Form Type	Description	Rate	Rate Unit	Appl Code	Appl Description
750	G/KG	WG		0.20	kg/10000 m2 LWA	A-I	start mid of April-preventiv

Rate Unit Personal List (RUA.$)

Rate Unit	Description 1
B Bio En/ha LWA	Billion Biological Entities per 10000 Square Meters Leaf Wall Area (US=same)
g AI/10000 m2 LWA	Grams Active Ingredient per 10000 Square Meters Leaf Wall Area (US=same)
g/10000 m2 LWA	Grams Dry Product per 10000 Square Meters Leaf Wall Area (US=same)
kg AI/10000 m2 LWA	Kilograms Active Ingredient per 10000 Square Meters Leaf Wall Area (US=same)
kg/10000 m2 LWA	Kilograms Dry Product per 10000 Square Meters Leaf Wall Area (US=same)
L/10000 m2 LWA	Liters Product per 10000 Square Meters Leaf Wall Area (US=same)
mL/10000 m2 LWA	Milliliters Product per 10000 Square Meters Leaf Wall Area (US=same)

- and the treatment line is linked to an application code for which the Leaf Wall Area field is calculated.

Scenario 2: Using an LWA Spray Volume

- An LWA Application Amount is selected,
- and the treatment line is linked to an application code for which the Leaf Wall Area field is calculated.