

# Decision Support System for MedflyNet

**2nd Consortium Meeting**

**July 27-29, 2022**

**University of Molise Campobasso, Italy**

# Decision Support System



- DSS1: FIELD ACTIVITIES START

- DSS2: WHEN AND WHERE TO SPRAY

define the trees to be treated and the treatment to use: BAIT Spray or COVER Spray

- DSS3: SPRAYING

define the spraying procedure



# DSS1: FIELD ACTIVITIES START



**Estimate the date of the fly presence in the field based on the calculation of DD. From this date it is indicated to place traps in the field.**

It is based on the Degree Days (DD) calculation:  $DD = \sum_k^n T_{mean} - 10.2^{\circ}\text{C}$  if  $>0$ ;  $=0$  if  $<0$

$$T_{mean} = \frac{T_{max} + T_{min}}{2}$$

$K = 1^{\text{st}}$  of January

$n$  = days starting from 1° January

$T_{mean}$  = daily mean temperature in °C

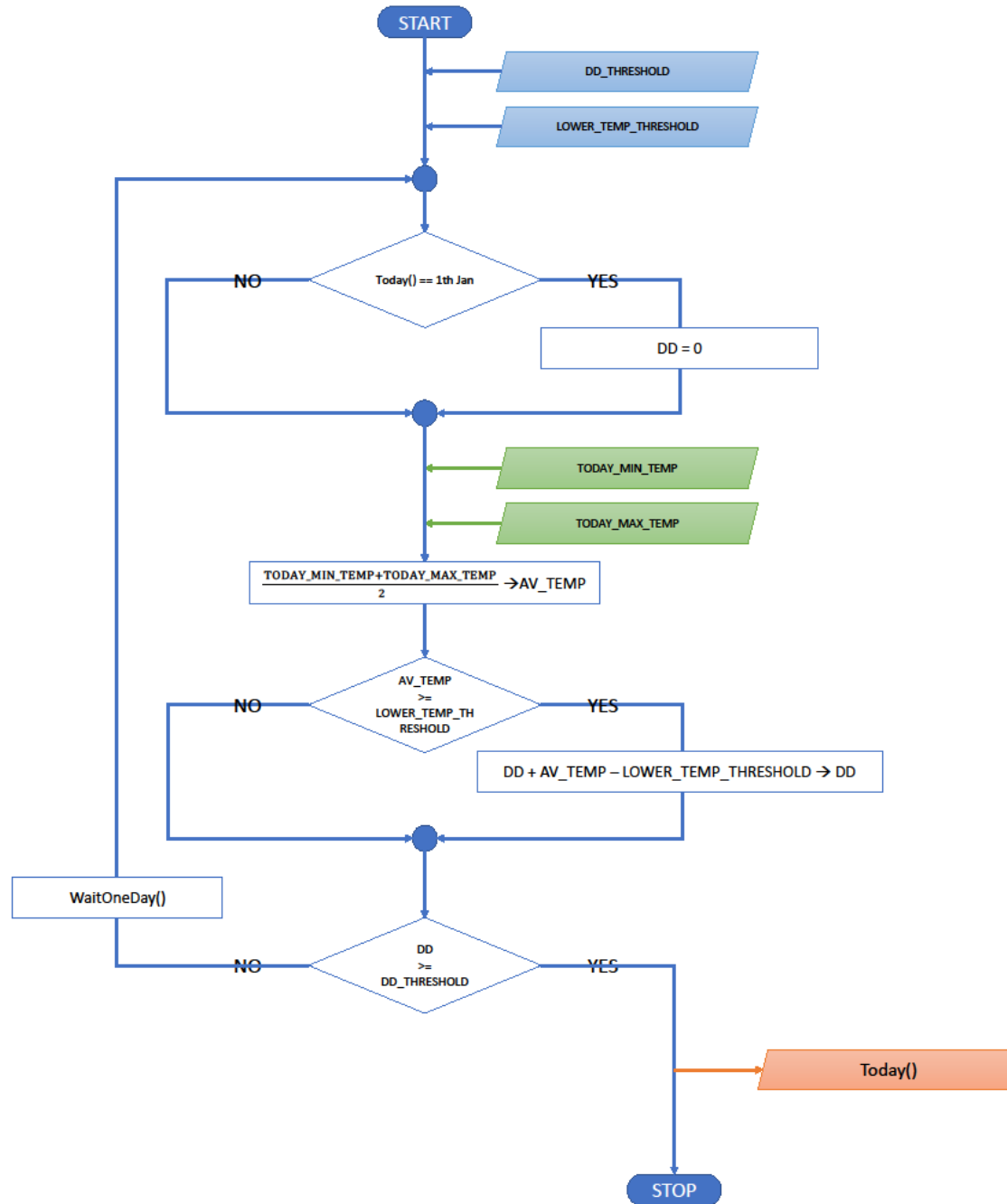
10.2°C = lower development threshold

## **620 DD threshold for the first emerging adults**

In 2022 for Verbesi site, it was reached on 10 June. The first Medfly catch was on 10 July.



Main: DSS\_1



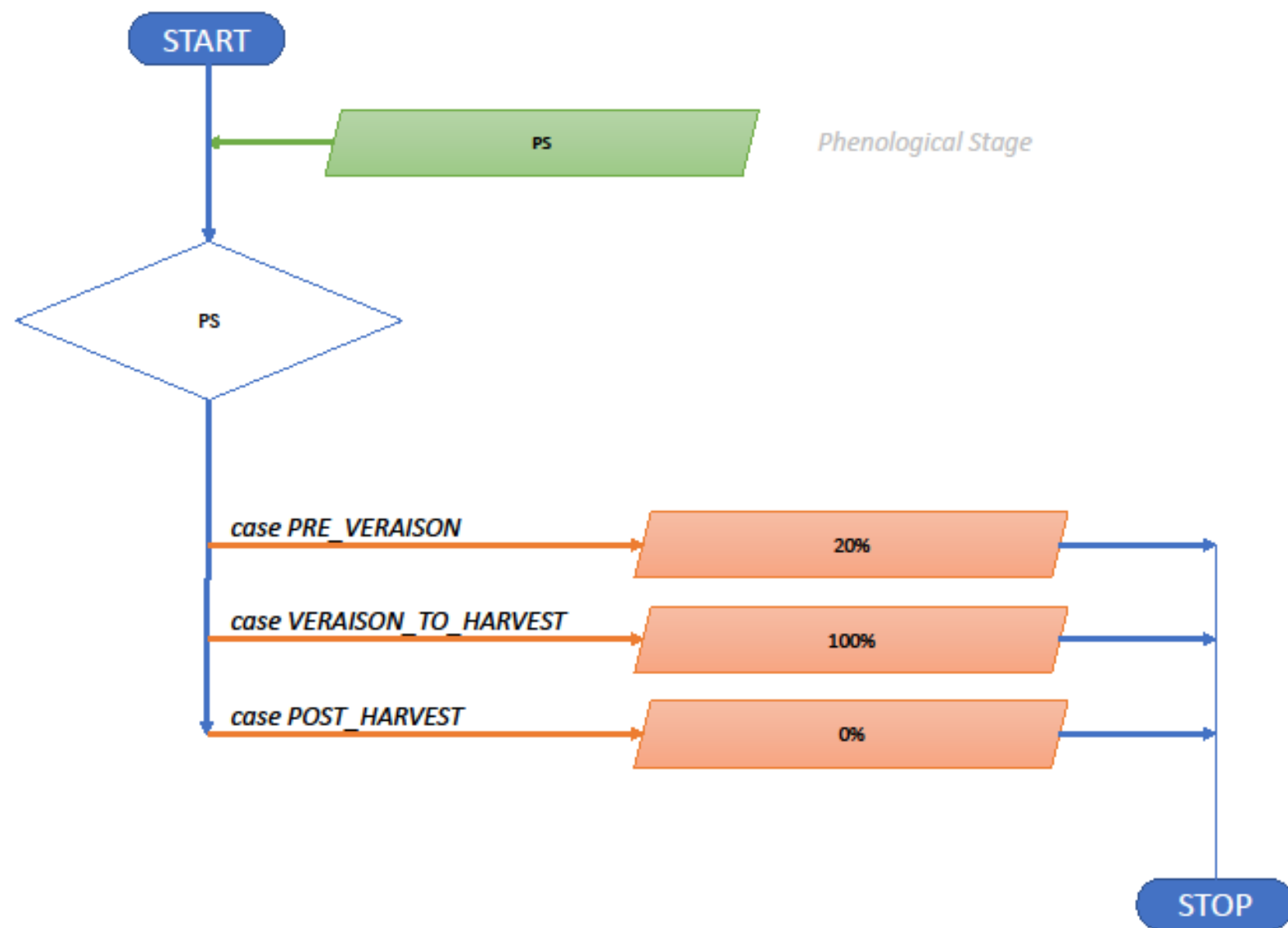
## DSS2: WHEN AND WHERE TO SPRAY

Step 1: Setting the risk (percentage) related to the plant phenological stage

	PRE VERAISON	VERAISON TO HARVEST	POST HARVEST
CULTIVAR RISK	20%	100%	0%



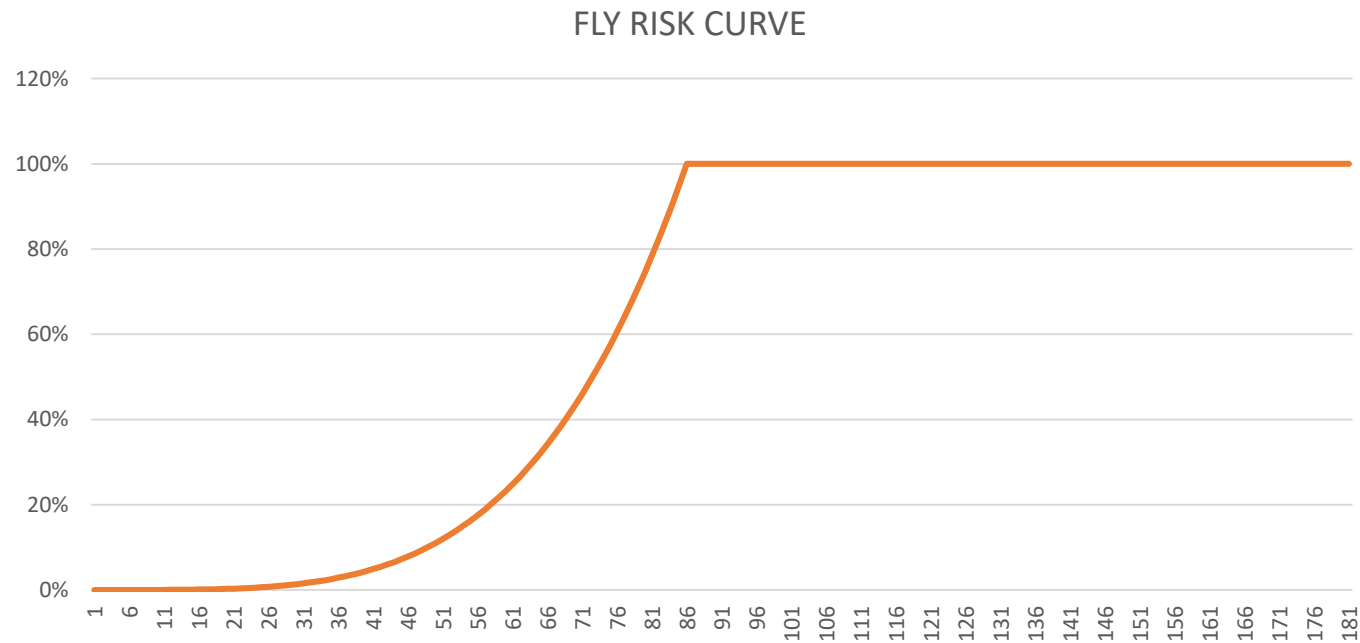
Subroutine: *getCultivarRisk*



# DSS2: WHEN AND WHERE TO SPRAY

Step 2: Setting the risk (percentage) related to the fly population dynamic:  
number of days from the estimated emerging day calculated by DSS1

Estimated days of maximum FLY RISK	85
CURVE'S POWER	4



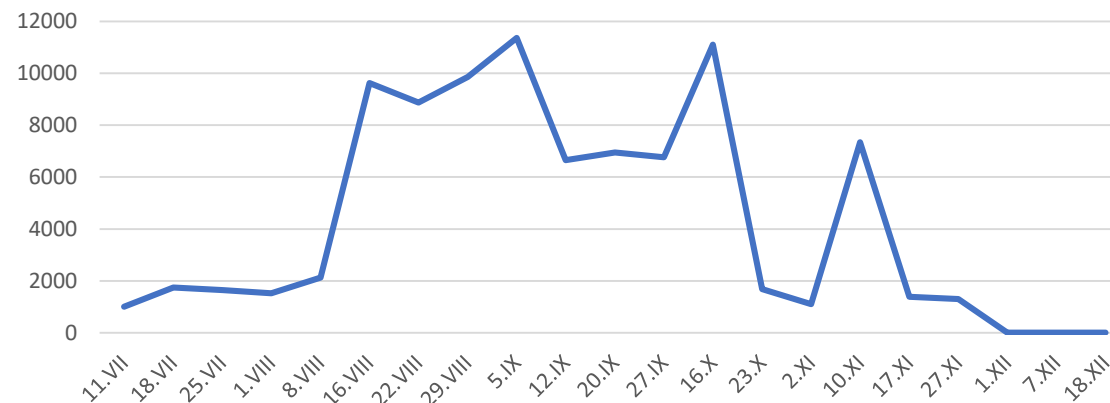
# DSS2: WHEN AND WHERE TO SPRAY

Step 2: The setting must be done locally, based on 2-3 years of trap catches

2017 DSS1 Set trap: 10 June

Peak: 5 September

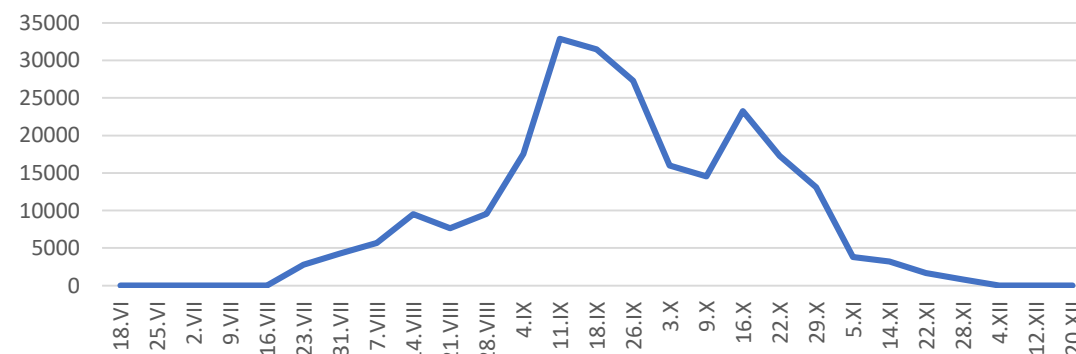
88 days



2018 DSS1 Set trap: 17 June

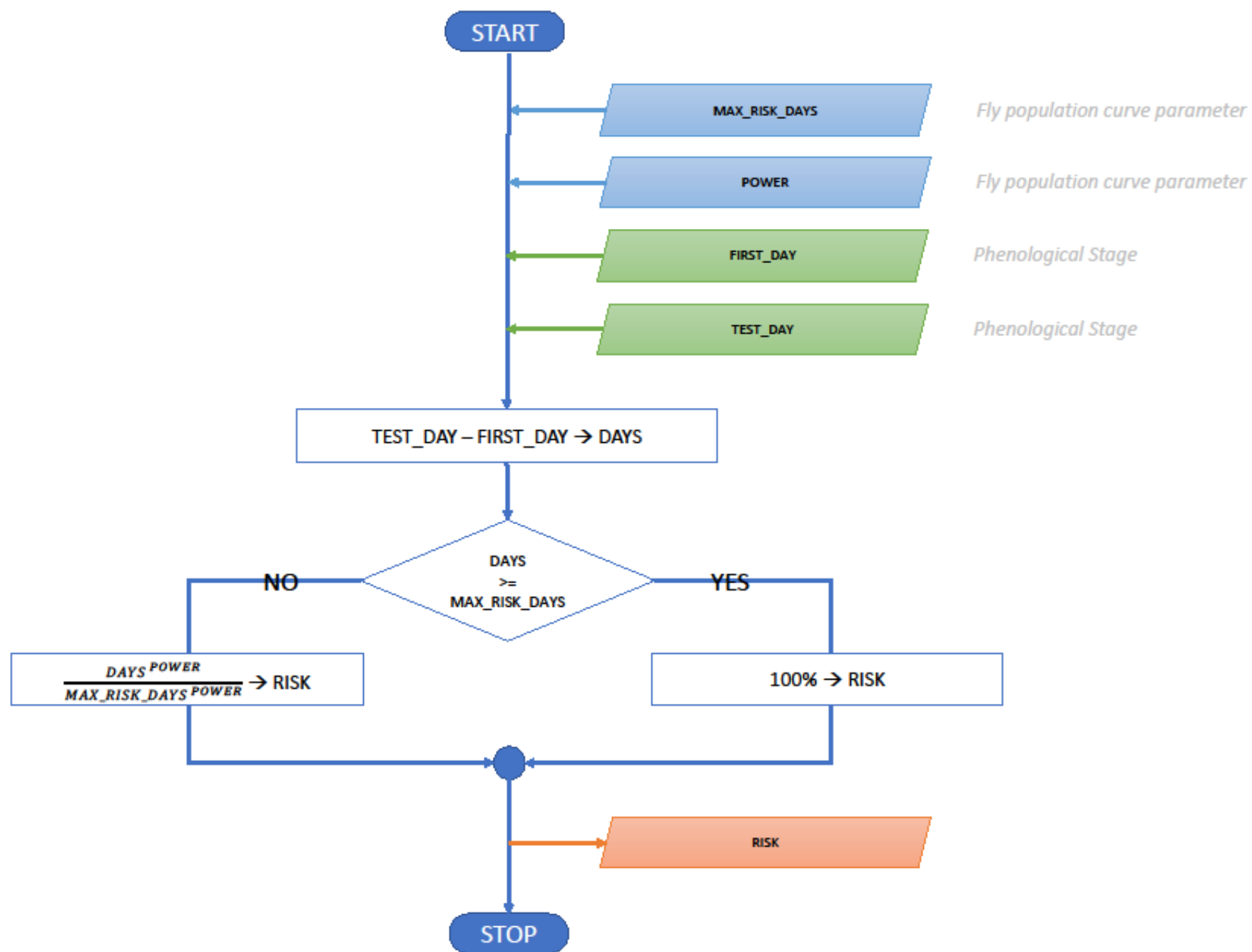
Peak: 11 September

87 days





Subroutine: getFlyRisk

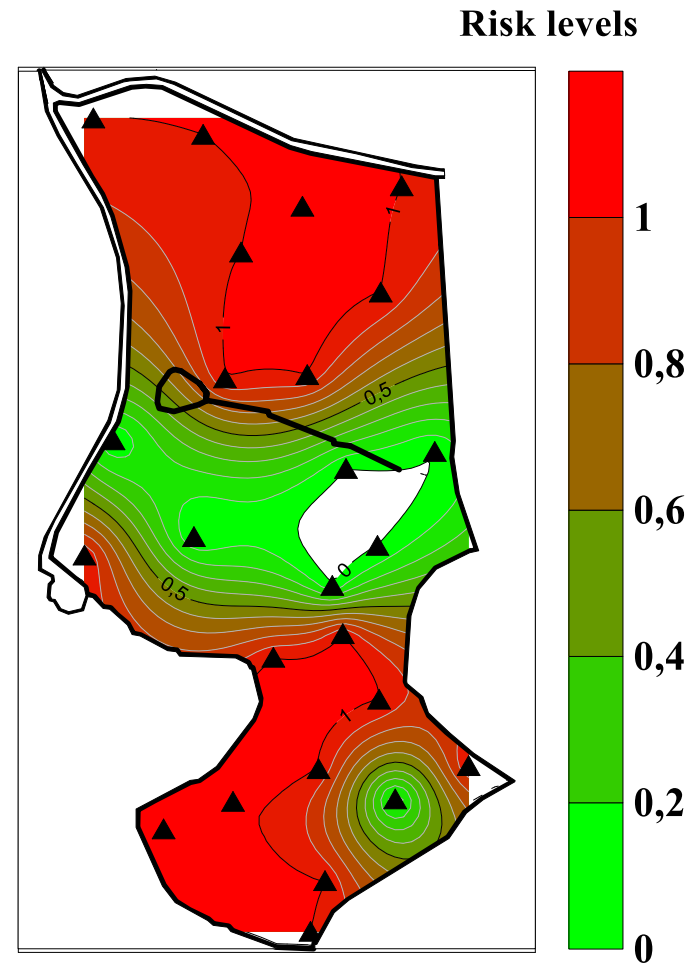
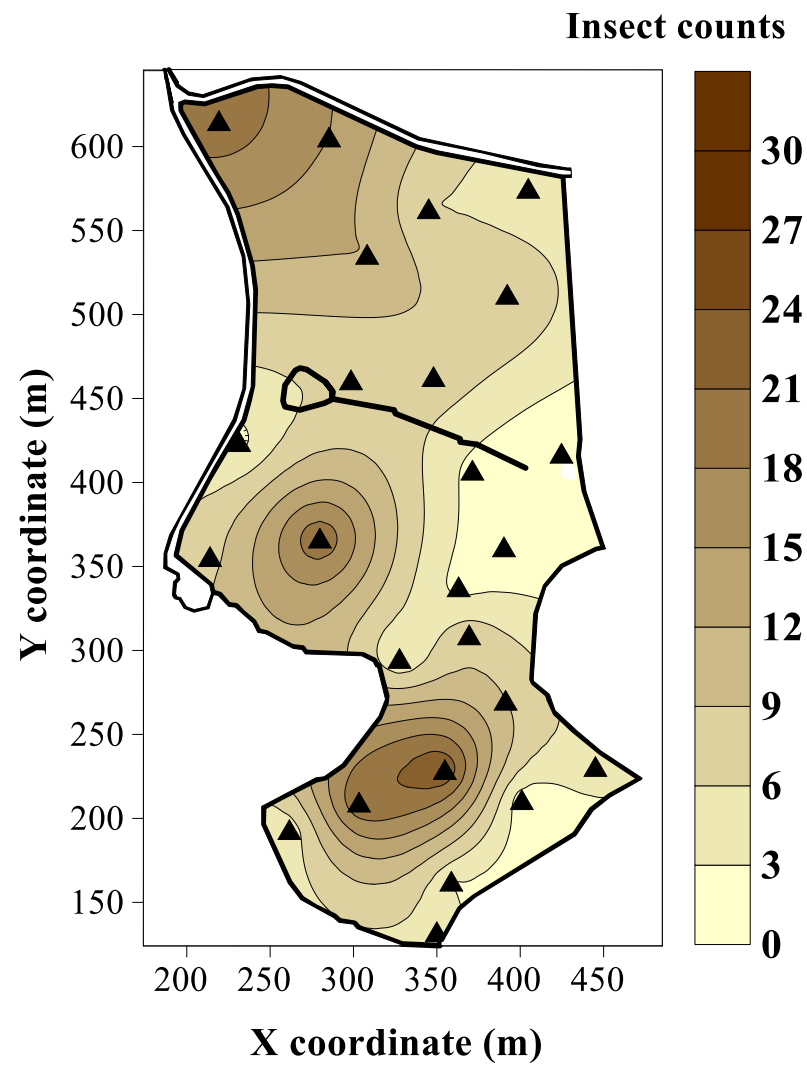


## DSS2: WHEN AND WHERE TO SPRAY

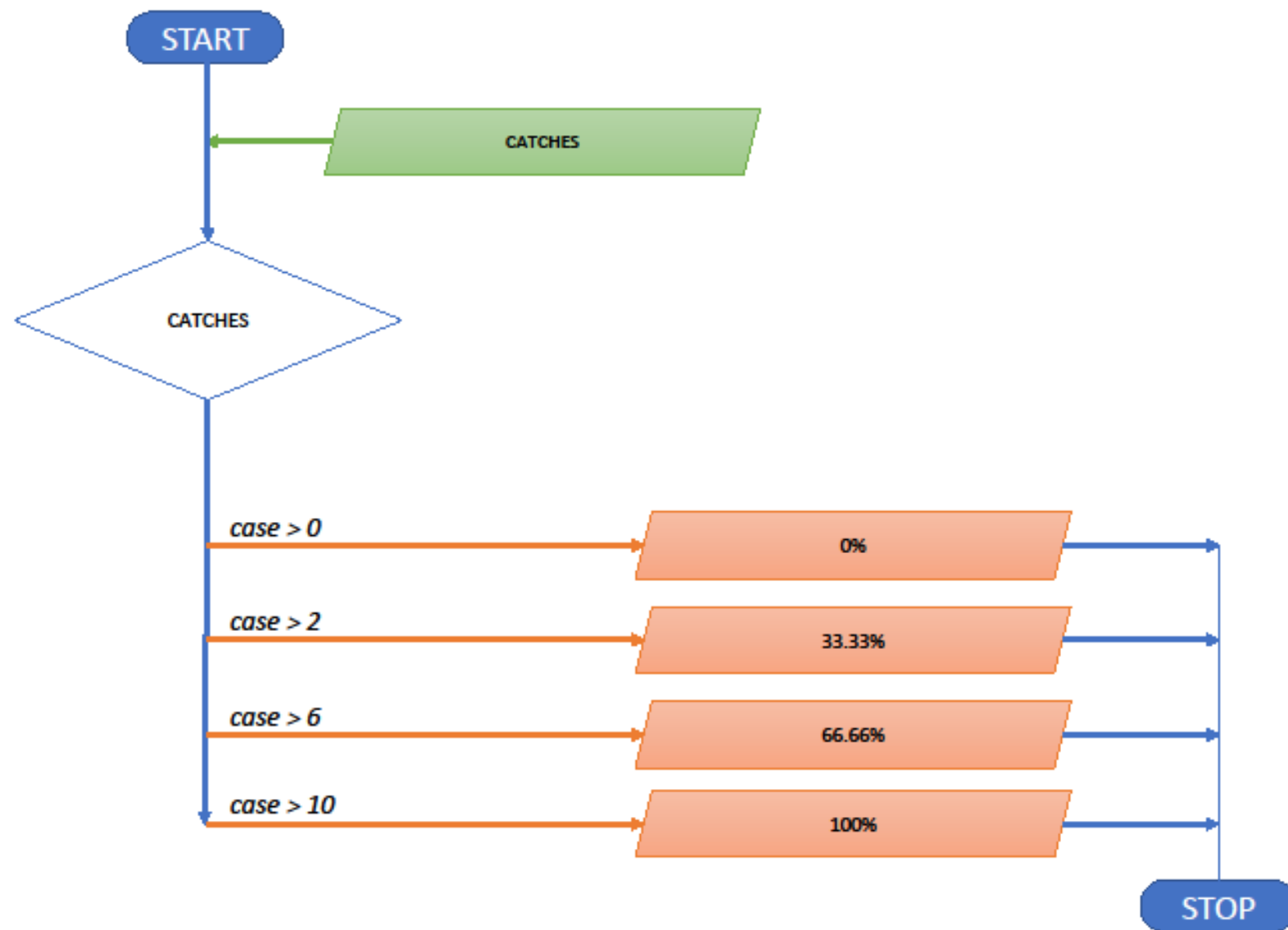
Step 3: Setting the risk (percentage) related to the fly catches in the trap (spatial variability)

		CATCH N° >	CATCH N° <=	RISK %
	NULL	0	2	0.00%
	LOW	2	6	33.33%
	MEDIUM	6	10	66.66%
	HIGH	10		100.00%

THIS DATUM IS INTERPOLATED TO GET A TRAP VALUE FOR EACH TREE IN THE FIELD



Subroutine: getCatchesRisk



## DSS2: WHEN AND WHERE TO SPRAY

Step 4: Assign to each tree in the field the risk (percentage)

-Calculate the **average risk** (percentage) related to the cultivar stage and the fly population dynamics

$$\text{Average Risk: (Cultivar Risk + Fly Risk) / 2}$$

-Calculate the **total risk** (percentage) for each tree:

$$\text{Total Risk: Average Risk * Fly Catch Risk}$$

## DSS2: WHEN AND WHERE TO SPRAY

Step 5: select the treatment , based on the total risk

	TOTAL RISK >	TOTAL RISK <=
NONE	0%	20%
BAIT	20%	40%
COVER	40%	100%
MASS*	based on presence of fruit in the field	

\*option only valid in post-harvest, if there are high catches

## DSS3: SPRAYING

define the spraying procedure: the algorithm check for each tree to be treated if the treatment is necessary or there is a cover of the previous treatment or the weather conditions are unfavourable;

The unit spray is the single CULTIVAR: the same treatment is applied to the whole cultivar.

DSS2 output is a treatment for each tree. In order to uniform at the cultivar level, the most common output from DSS2 is used for all trees in the same cultivar.