



MUST-B field data collection – Data Model

Table: Sites

This table contains general information about the sites where the data collection took place.

Variable name	Description	Terminology	Mandatory	Data type
siteNo	Unique identifier of the site		Y	xs:string(100)
siteName	Name of the site		Y	xs:string(250)
Country	Country where the site is located	COUNTRY	Y	xs:string(2)
UTMCoordinates	Coordinates of the site in UTM format		Y	xs:string(100)

Table: Polygons

This table contains general information about the polygons where the botanical survey took place.

Variable name	Description	Terminology	Mandatory	Data type
siteNo	Identifier for the site		Y	xs:string(100)
UniquePolyID	Unique identifier of the polygon		Y	xs:string(250)
Area	Size of the polygon in square metres		Y	xs:double(20,10)
UTMCoordinatesOfCentroid	Coordinates of the polygon centroid in UTM format		Y	xs:string(100)

Table I: Pesticides application

This table is used for reporting any pesticide applications included in the survey design.

Variable name	Description	Terminology	Mandatory	Data type
applicationId	Unique identifier for each pesticide application		Y	xs:string(100)
siteNo	Reference number for site included in the survey		Y	xs:string(100)
fieldno	Reference number for field		Y	xs:string(100)
cropCode	EFSA Code for crop grown on the farm	MTX	Y	xs:string(5)
cropText	Additional information on crop		Y	xs:string(250)
fieldArea	area of field in hectares		Y	xs:double(20,10)
site_slope	Slope of the field			xs:double(20,10)
usageY	Year of application		Y	xs:integer(4)
usageM	Month of application		Y	xs:integer(2)
usageD	Day of application		Y	xs:integer(2)
cropStage	Code to indicate crop stage		Y	xs:string(2)
cropHeight	Height of crop in meters			xs:double(20,10)
productName	Names of plant protection product applied		Y	xs:string(250)
activeSubstance	Active substance applied	PARAM	Y	xs:string(5)
applicationCode	Code for the method of application of the product		Y	xs:string(2)
lowdrift	Brief description of any drift reduction technology used		Y	xs:string(400)
speed	Forward speed of sprayer (km h ⁻¹)		Y	xs:double(20,10)
nozzleType	Nozzle Type			xs:string(20)
nnozzles	The number of nozzles in total used to deliver the dose			xs:integer(4)
nozzleSpacing	Nozzle Spacing			xs:string(20)
nozzleOrientation	Nozzle angle upwards/downwards			xs:string(20)
dropletSize	Droplet size Microns			xs:string(100)
nBar	Nozzle pressure in bar		Y	xs:double(20,10)
boomHeight	Boom height in metres		Y	xs:double(20,10)
boomWidth	Boom width in metres		Y	xs:double(20,10)
formulation	CIPAC formulation types		Y	xs:string(2)
volume	Volume of water litres/hectare for spray applications		Y	xs:double(20,10)
doseRate	Actual dose rate for the product		Y	xs:double(20,10)
amount	Quantity of product used per hectare in kilograms		Y	xs:double(20,10)
sprayRound	Numerical code for products within one spray tank		Y	xs:string(2)
treatedArea	Area treated with product in hectares in the spray round		Y	xs:double(20,10)
startTime	start time			xs:string(10)
hours	Number hours spraying		Y	xs:double(20,10)
icBuffer	Record the width (in metres) of any in-crop buffer			xs:double(20,10)

Table II: Resource providing unit and landscape fitness

This table is used for reporting the results of the botanical survey in the area surrounding the study site.

Variable name	Description	Terminology	Mandatory	Data type
resId	Identifier for the report		Y	xs:string(100)
siteNo	Identifier for the site		Y	xs:string(100)
fieldNo	Identifier for the field if the observation was taken in one of the treated fields			xs:string(100)
polygonId	Identifier of the polygon as reported in the polygons table		Y	xs:string(250)
latitude	Latitude of instrument in WGS84 decimal format			xs:double(9,6)
longitude	Longitude of instrument in WGS84 decimal format			xs:double(9,6)
UTMCoordinates	Coordinates of the instrument or the polygon in UTM format			xs:string(100)
sampY	Year of observation		Y	xs:integer(4)
sampM	Month of observation		Y	xs:integer(2)
sampD	Day of observation		Y	xs:integer(2)
sampMatCode	Plant species identified at the location		Y	xs:string(100)
plantType	Indicate whether the plant is a crop or a weed	Crop / Weed / Wild plant	Y	xs:string(20)
vegetativeType	Vegetative type of the observed plant	Herb / Shrub / Sub-shrub / Tree	Y	xs:string(20)
flowering	Indicate if flowers were observed on the plant	YESNO	Y	xs:string(1)
abundanceClass	Classification of abundance of plant species at site inspected	For shrub and tree: 3 = large and abundant 2 = of intermediate size or small but abundant 1 = small and not abundant For herb and sub-shrub: 3 = covers at least 75% of the area and flowers are abundant 2 = covers 25-75% of the area and flowers are abundant 1 = covers less than 25% and/or flowers are not abundant	Y	xs:string(100)
pollen	Pollen sample taken	YESNO	Y	xs:string(1)
nectar	Nectar sample taken	YESNO	Y	xs:string(1)
anMetText	Method of identification	Visual / Morphological key / DNA analysis	Y	xs:string(20)

Table III: Hive measurements

This table is the master list of all hives/colonies included in the study. The corresponding hiveNo is selected when reporting observations for a hive/colony in the Colony management, Colony observations and Laboratory analyses tables (i.e. Tables IV, V & VI).

Variable name	Description	Terminology	Mandatory	Data type
hiveId	Unique identifier of the hive		Y	xs:string(100)
beeKeeperID	Identifier for diary keeper		Y	xs:string(100)
siteNo	Identifier for the site		Y	xs:string(100)
hiveNo	Identifier for the hive/colony		Y	xs:string(100)
sampCountry	Country where the sample was taken for laboratory testing (ISO 3166-1-alpha-2)	COUNTRY	Y	xs:string(2)
latitude	Latitude of hive in WGS84 decimal format			xs:double(9,6)
longitude	Longitude of hive in WGS84 decimal format			xs:double(9,6)
UTMCoordinates	Coordinates of the hive in UTM format.			xs:string(100)
hiveType	Type of hive	Dadant Langstroth Norwegian	Y	xs:string(20)
subSpecies	Bee subspecies	Apis mellifera carnica Apis mellifera iberiensis Apis mellifera mellifera x buckfast Apis mellifera mellifera	Y	xs:string(100)
observationHive	Indicate if the hive is the observation hive or an experimental hive	YESNO	Y	xs:string(1)
colonySize	Colony size on entry into the survey			xs:double(20,10)

Table IV: Colony management

This table is used by the beekeeper maintaining the hives for the duration of the study. It is designed to be a diary which can be completed whenever the hive is visited. Inputs e.g. supplementary feed or varroa treatment and outputs e.g. honey collection or removal of bees should be reported. This diary can also be used to record the general observations of the beekeeper.

Variable name	Description	Terminology	Mandatory	Data type
eventID	Identifier for the reported event		Y	xs:string(100)
beeKeeperID	Identifier for diary keeper		Y	xs:string(100)
siteNo	Identifier for the site		Y	xs:string(100)
hiveNo	Identifier for the hive		Y	xs:string(100)
eventY	Year of event		Y	xs:integer(4)
eventM	Month of event		Y	xs:integer(2)
eventD	Day of event		Y	xs:integer(2)
eventType	Classification of type of event	CLINICAL SIGNS / INPUT / INSPECTION / OTHER / OUTPUT / QUEEN LOSS / SAMPLE / SWARM	Y	xs:string(50)
inoutType	Type of material added or removed from hive (e.g. varroa treatment, supplementary feeding, altering bee population). Must be completed if INPUT or OUTPUT is selected in eventType	Amitraz / Brewers yeast / Bromopropylate / Brood comb / Camphor / Coumaphos / Cymiazole / Empty frame / Eucalyptol / Fluvalinate / Food comb / Formic acid / Foundation comb / Honey / Lactic acid / Live bees / Menthol / No input-output / Oxalic acid / Pollen / Queen excluder / Soybean flour / Sucrose / Super + 10 frames / Thymol / Umethrin		xs:string(50)
inoutQuantity	Amount of material added to or taken from			xs:double(20,10)
inoutUnit	Units for quantity reported	UNIT		xs:string(5)
clinicalSigns	Categorise the type of clinical signs observed if CLINICAL SIGNS is reported	Black queen larvae / Black shiny honey bees / Brood and honey destruction / Cannibalism on larvae or on pupae / Cell cappings opened / Crawling honey bees, bees clinging to the grass / Dead bees in hive bottom / Dead colony / Dead honey bees in front of the hive / Dead bees in hive bottom / Dead honey bees within cells with the heads directed to the bottom of the cell (starvation) / Dead honey bees within cells with the heads sticking out the cells / Doubtful clinical signs / Galleries inside the frames / Honey bees with deformed and/or atrophied wings / Impeded/occupied flight board / Larvae with a yellowish to brown colour / Mummified larvae / No clinical signs / Phoretic beetles-unusual larvae or eggs / Phoretic varroa / Queen problems / Ropy larvae (match test positive) / Slumped larvae / Specific odor of AFB / Spotty brood pattern / Suspect atypical mite / Traces of diarrhea / Trembling honey bees / Unusual honey bee mortality according to bee inspector		xs:string(100)
eventDescription	Details of reported event			xs:string(500)

Table V: Colony inspections

This table collects the information obtained during the fortnightly inspections. The results of samples taken for laboratory analysis should be reported in the Laboratory analyses table (Table VI). Outputs from in-hive monitors are also stored in this table.

Variable name	Description	Terminology	Mandatory	Data type
resId	Identification code of an analytical result (a row of the data table) in the transmitted file		Y	xs:string(100)
siteNo	Identifier for the site		Y	xs:string(100)
hiveNo	Identifier for the hive		Y	xs:string(100)
frameNo	Identifier for the frame to be used for comb observations			xs:string(100)
sampY	Year of visit		Y	xs:integer(4)
sampM	Month of visit		Y	xs:integer(2)
sampD	Day of visit		Y	xs:integer(2)
sampT	Time of visit		Y	xs:string(10)
paramText	Observation made at the hive	Colony weight / Number of adult bees / Number of beebread cells / Number of cells honey / Number of cells nectar / Number of departing foragers / Number of eggs / Number of larvae / Number of other cells / Number of returning foragers / Number of worker brood cells	Y	xs:string(100)
anMethText	Methods used to take the observations listed above	Automatic recording / Comb inspectionVideo and image analysis		xs:string(250)
resVal	Quantitative assessment of the observation. This value must be complete for all quantitative assessments e.g. number of the different types of bees			xs:double(20,10)
resUnit	Unit of measurement for the values reported. This must be reported for all quantitative assessments	UNIT		xs:string(5)
resValUncert	Indicate the expanded uncertainty value (usually 95% confidence interval) associated with the measurement expressed in the unit reported in the field 'Result unit'			xs:double(20,10)
resValUncertSD	Standard deviation for the uncertainty of measurement			xs:double(20,10)
resQualValue	This value must be completed for the qualitative clinical sign observations. For each sign absence or presence should be indicated	POSNEG		xs:string(3)

Table VI: Laboratory analyses

The results of laboratory results from the study are reported in this table. This table is used for reporting laboratory tests for bee infectious agents, chemical residues in all matrices collected during the study and for compositional analysis of pollen samples.

Variable name	Description	Terminology	Mandatory	Data type
resId	Identification code of the analytical result		Y	xs:string(100)
sampUnitIds	Identifier of the site (holdingId in SSD2) and of the hive (herdId)			compound
sampId	Identifier of the sample taken		Y	xs:string(100)
sampCountry	Country where the sample was taken	COUNTRY	Y	xs:string(2)
sampY	Year of visit		Y	xs:integer(4)
sampM	Month of visit		Y	xs:integer(2)
sampD	Day of visit		Y	xs:integer(2)
sampEventInfo	Time of sampling (sampT)			xs:string(10)
sampSize	Sample size			xs:double(20,10)
sampSizeUnit	Unit in which the size/amount of the sample is expressed.	UNIT		xs:string(5)
sampMatCode	Matrix sampled	MTX	Y	compound
sampMatText	Further details on the matrix sampled			xs:string(250)
analysisY	Year when the analysis was completed		Y	xs:integer(4)
analysisM	Month when the analysis was completed		Y	xs:integer(2)
analysisD	day when the analysis was completed		Y	xs:integer(2)
anPortSeq	Sequence number (e.g. 1, 2, 3) for samples where the analysis is replicated			xs:string(100)
labId	Identification code of the laboratory		Y	xs:string(50)
labAccred	Accreditation status of the laboratory	LABACC		xs:string(5)
paramCode	Code to identify the pesticide residue, pathogen or nutrient the method is designed to detect	PARAM	Y	compound
paramText	Plant species for pollen samples or further details on the pesticide residue, pathogen or nutrient			xs:string(250)
anMethRefId	Identifier of the method used in the laboratory			xs:string(50)
anMethCode	Analytical method used	ANLYMD	Y	compound
anMethText	Further details on the analytical method			xs:string(250)
resUnit	Unit of measurement for the value in resLOD, resLOQ, resVal	UNIT		xs:string(5)
resLOD	Limit of detection			xs:double(20,10)
resLOQ	Limit of quantification			xs:double(20,10)
resVal	Result of the analytical measurement			xs:double(20,10)
resValRec	Recovery value associated with the concentration measurement			xs:double(20,10)
resValRecCorr	Indicates if the result was corrected for recovery	YESNO		xs:string(1)
exprResType	Indicates how the result is expressed (e.g. whole weight)	EXPRRES		xs:string(5)
resQualValue	Indicates if the qualitative evaluation of the result is positive or negative	POSNEG		xs:string(3)
resType	Type of result	VALTYP	Y	xs:string(5)
resValUncert	Expanded uncertainty value			xs:double(20,10)
resValUncertSD	Standard deviation of the uncertainty measurement			xs:double(20,10)

Table VII: Observation colony

This table collects the information obtained from the observation colony in order to determine foraging locations.

Variable name	Description	Terminology	Mandatory	Data type
observationId	Unique identifier of the observation of the waggle dance performed at a certain time by one individual.		Y	xs:string(100)
dancerId	Unique identifier of the bee performing the waggle dance.		Y	xs:string(100)
siteNo	Identifier for the site		Y	xs:string(100)
hiveNo	Identifier for the observation hive		Y	xs:string(100)
sampY	Year of visit		Y	xs:integer(4)
sampM	Month of visit		Y	xs:integer(2)
sampD	Day of visit		Y	xs:integer(2)
sampT	Time of visit		Y	xs:string(10)
waggleDuration	Duration of waggle dance in seconds			xs:double(20,10)
waggleLength	Radius of waggle dance in mm			xs:double(20,10)
waggleOrientation	Orientation in degrees			xs:double(20,10)
waggleDirection	Direction in degrees			xs:double(20,10)
pollenColor	Classification of pollen			xs:string(50)
pollenAbundance	Abundance of pollen classified by colour			xs:string(100)