How do you know which residues to look for?

There are several scientific sources that can lead us down the path to relevant residues.
Metabolism studies provide the information we need to define the relevant residues.

When a biological system – a plant, an animal, soil, etc. – is exposed to or treated with a crop protection product, the substances in the product are broken down – metabolized – by the system. Thus the residues of a product in a biological system might not necessarily be of the substance itself, but of various break-down products (metabolites).
To asses this degradation, metabolism studies are conducted.
Pure substances are applied to plants, soil, animals, water, etc. and relevant samples taken at appropriate intervals from those systems are analyzed to see what compounds are present. Using this information, scientists can define the compounds which can be used to „track“ the residues of a particular compound in a particular biological system.

By conducting metabolism studies, we can gather information on...

Distribution of the residues

Evaluations are conducted to see where the residues are eliminated and/or where they accumulate in a test system. This is the primary objective of an ADME (absorption, distribution, metabolism, excretion) study.

For example, by using autoradiographic techniques (essentially photography of the radiolabeled compounds` accumulation in, for example, rats), it can be shown whether a product tends to be distributed widely in the body, or preferentially to certain organs, or not distributed much at all.

Metabolic Pathways

The radiolabeled residues found are analyzed in order to identify them (by elucidating their chemical structures). Chemists can then tell what processes play a role in the breakdown of a product, which new compounds (metabolites) are formed as a result, and how high the concentration of the metabolites is.
This allows the scientist to create a “metabolic pathway”, the path leading from the initial exposure to the original product to all of its breakdown products.

When we have conducted the metabolism studies and have information on the distribution of the residues and the pathways, we understand...

The Nature of the Residues

This term refers to the compounds which comprise or make up the residues. Essentially, it's how many compounds are formed, which compounds are they, and how much of each compound is formed in a biological system after application of a Plant Protection Product. (The substances we see in the biological system are not necessarily the same as the ones applied, but rather something else: break-down products or metabolites.)

This information is used to define the residue.

The residue definition describes the compounds/substances we must analyze for in order to "track" the use of a particular product. It can include the substance applied and/or various break-down products.

There are various residue definitions for various purposes (e.g. risk assessment, monitoring). We analyze for these residue definitions when we conduct field residue trials. Authorities also use an appropriate residue definition to analyze samples of our foods, when they monitor the levels of plant protection products in marketed produce.