



Trends in innovation 2009, by Jean-Bernard Montalescot, SITEVI technology advisor

Judging by the innovations presented by their exhibitors, SITEVI has once more confirmed its position as world leader and the exhibition of reference in the wine/vine and fruit/vegetable industries. For many years now, this position has been based on the ability of European manufacturers to produce new tools for working vines, to develop techniques that enhance performance in the making of quality wines, their rearing and their packaging.

From the processing of research results to the development of new products, adapted to market needs and those of professionals to develop their businesses, the path is a long one. The innovative approaches you see are the fruit of market specialists having listened closely to the needs of consumers and carefully analyzing what they have been told.

Wine-making equipment will take pride of place, and the first trend is already focusing on the quality of wine-making, clearly evidenced here with new portable sensors for vineyards. The most modern technologies, for example, determine the optimum date for harvesting, or use computers mounted on board harvesting machines, something which no other sector of application can pride itself in. Decision-support tools for vineyard management now benefit from state-of-the-art technology delivered by on-board information systems for the control, administration or management of grape harvesting machines.

Knowledge of the wine-making process opens up new avenues for fermentation management, the treatment of musts and for filtering, or in simplifying the programming of presses. Upstream of the mechanization of operations for managing and maintaining vineyards, traditional technologies provide a direct response to energy efficiency programmes, or the need to limit the use of plant-care products, in line with the Ecophyto 2018 European plan.

The economic difficulties currently being experienced by the wine market are also encouraging innovation in marketing strategies. The packaging of wines must be faultless in terms of health and laboratory measurements are being developed and made available to producers with increasing speed. The marketing of wines has benefited from innovations in terms of packaging, with the simplification of packs that favour advertising. This is a sector undergoing rapid growth, just like SITEVI, which will also be showcasing all the equipment needed for fruit and market-garden farming.

1. The first trend has to do with the quality of wine-making thanks to the miniaturization of portable sensors and the performance of on-board electronic management and sorting systems.

. "Pedestrian" sensors for determining maturity:

The portable device for taking non-destructive, instant measurements, with a view to predicting the date of harvesting (PELLENC) is none other than a portable, ergonomic autonomous spectrometer designed to help monitor the level of maturation of grapes in the vineyard using instant, non-destructive techniques. Geo-located via GPS and coupled to a software package capable of modelling maturation kinetics, the system predicts the optimum date for harvesting. The various contents characteristic of the maturity of the grape (anthocyanins, sugar, acidity, water content) can be viewed directly on a graphical screen.

Another multi-parameter, portable optical sensor (FORCE A) takes non-destructive measurements on grapes in real time, to determine the polyphenols present or induced, as well as their chlorophyll content. The device employs the fluorescence of the chlorophyll. Fluorometry measures the light retransmitted after absorption by the grape, the anthocyanins present on the surface and the deep chlorophylls. The data is saved on a memory card, before being downloaded into Excel, the results then being sent and interpreted with a view to monitoring the phenolic maturity of grapes in the vineyard.



. A self-propelled machine designed specifically to select high-quality harvests

This self-propelled High Quality Selection machine (NEW HOLLAND) combines new technologies such as geolocation via satellite and on-board microcomputers. It makes it possible to take into account the varied nature of each plot for farming operations throughout the vine cycle. The characteristics of the earth, topography, attacks by parasites, and the presence of weeds can vary, even within a single plot. It has been designed to achieve the modulated management of inputs with a view to adapting all work to the varied characteristics of the plot. All the work performed on the vine is involved: from enrichment to harvests, as well as tillage and canopy management. Using maps or based on visual sighting, the harvesting machine automatically sorts the grapes into the trailer to the right or left, depending on criteria of maturity or harvest quality.

. On-board electronic systems for the administration, adjustment, control and management of grape harvesting machines: substantial energy savings

The features offered by the "I.M.S intelligent management system" (NEW HOLLAND) allow for the automatic adjustment of the engine rating, depending on the power required by the machine's "consumers" of energy, such as the wheel, shaking, suction and conveyor motors, oil radiator fan, air conditioning, etc. This means that, in harvesting mode, when the driver turns off the shaking and suction machines at the end of a row with a view to performing a manoeuvre, the engine rating automatically adjusts and drops. Similarly, the I.M.S. also makes it possible to retain constant settings for all the machine's functions in harvesting or multi-tasking, whatever the conditions. (E.g. controlled movement of the shakers in the event of missing vines).

The new range of grape harvesting machines (GREGOIRE) incorporates an innovative principle for the management of on-board systems (motor, transmission, hydraulics etc.). This offers greater comfort to the user, as well as exclusive features for optimizing yield and efficiency. In addition, the joystick is equipped with a linear neutral position system which allows the number of functions performed to be tripled. The user interface systems - colour touch screen, adjustment console and joystick - are fitted with a recognition system which, depending on the equipment present (harvesting head, sprayer, vine maintenance tools), allows for the automatic resetting of commands, automatic updating of command pictograms and the management of specific functions of each tool, without the addition of a cabin box.

. On-board sorting systems for grape harvesting machines: quality the goal

Placed beneath the high-speed grain separation grid system and designed to extract leafstalks as well as small-sized stem ends, while respecting the grapes, the system (GREGOIRE) is based on a principle of sorting rollers broadly familiar, for example, from the mechanical harvesting of olives. Its originality and innovativeness, however, resides in the fact that it is a system which allows for continuous adjustment of the distance between two successive rollers. Each roller is indexed in a multiple gear system with a different step. Rotation of the gear by one turn thus leads to a displacement of x mm in the first roller, $2x$ mm in the second roller, and so on. The distance between the rollers can therefore easily and precisely be adapted to the size of the grapes, which can vary greatly from one vine to another. Work rate, sorting quality and respect for the harvest are thus optimized.

. Transport of the grape harvest by trailer with an automatic pneumatic shock absorber (STHYK) combines the properties of air cushions, hydraulic shock absorbers and automatic controls. Cushions of air absorb the vibrations and vertical accelerations of the tongue bar, while the shock absorber slows down displacements. Combining as it does a trailer, pneumatic suspension and automatic controls, this technology for transporting the harvest retains its shock-absorbing properties whatever the load carried, while **maintaining the grapes intact**.

2. The second trend has to do with the management of vineyards based on the requirements for protection of the environment and the health of operators

Heavy demands are imposed in respect of farming tasks, in a context in which costs must be kept down, quality increased, comfort and health taken into account and the 'hard work' taken out of farming, at the same time as paying greater attention to the environment.



. The spreading of plant-protection products: limiting emissions into the air, controlling operation nozzle by nozzle, and the safe preparation of treatment mixtures.

The tunnel sprayer (BERTONI), the principal of which is widely used in "pedestrian" orchards, incorporates several improvements designed to apply the treatment product in a projected jet, while favouring its passage through the foliage by way of suction. The air stream follows a semi-circular path after a 180° rotation and, after it having crossed the vegetation, suction is performed on the other side. Spraying and recovery are performed on both sides of the vine, to ensure consistent treatment of the two faces while limiting air-borne drift.

The "VISIOBUSE" (GRV GROSJEAN) allows for the permanent and dynamic control of the performance of the nozzles of a sprayer. The signal is captured in front of each nozzle by an ultrasound sensor, linked to a miniaturized in-cabin indicator which provides the driver with information in real time. It can be adapted to all types of sprayer. It also contributes to the safety of the operator, who no longer needs to get out of the tractor to perform a visual check on the state of his nozzles (no inhalation of the product while the sprayer is working)

Designed at the Gard Chamber of Agriculture, this trailer for preparing plant-treatment mixtures will be of particular interest to farmers who use powder-based plant-protection products. Its mixing system guarantees efficient and consistent preparation, without the production of foam. Adapted by a programmer, its dashboard allows for the simplification of work by preparing a new mixture at the same time as the sprayer is taking care of the spreading. The taking of risks is avoided and handling facilitated through the pumping of mixtures or the emptying of the sprays.

. Working on the vine: an ancestral occupation to which mechanization is bringing advances in terms of the quality of work and the safety of high-clearance equipment.

The automatic positioning of the inter-winstock tool (EGRETIER) and it being maintained in its optimum working position are achieved by way of hydraulic jacks activated by an articulated sensor which remains in permanent contact with the earth and plants. The tool is kept continually in its optimum working position with respect to the plants, thanks to two adjustable quadrilateral assemblies, in two perpendicular planes, to compensate for errors in alignment, variations in ground height, and uncontrolled movements of the tractor. Any damage to the plants is avoided and the per-hectare cost of farming is significantly reduced. The driver can concentrate fully on driving his tractor, without having to be continually turning around.

The "anti-doming" shaker principle developed by CALVET is an original solution to ensure the even spreading of compost, which may often be damp and difficult to spread due to the "dome" effect which occurs in the hopper. The system employs a hydraulic motor with cam, which drives a connecting rod to create a pendular movement of the grid. The device performs a full sweep of the area in the bottom of the hopper. This movement loosens the product and acts like a sieve in feeding the lower screws. Given the high price of quality compost, the fact that it can be located in the right places allows losses to be kept to a minimum.

The self-propelled, straddle vehicle (GRV GROSJEAN) is characterized by a half-chassis to the front and half-chassis to the rear, arranged one behind the other while being assembled with the aid of a longitudinal pivot link. The half-chassis incorporate a central drive train and lateral drive train respectively, arranged in line. Two stabilization drive trains to the left and right are arranged on either side of the longitudinal axle of the vehicle. In the first instance, this "AXISS" carrier fulfils criteria of safety, ease of access and driving comfort. Permanently in contact with the ground, its four wheels give the vehicle excellent stability and driving characteristics. Its low driving position eases access for the driver and limits tilting effects that occur in higher positions.

3. The third trend in wine-making has to do with new ways of processing musts and filtration, or simplifying the programming of presses

. Wine-making products for a non-allergenic alternative to the fining of wines and biodegradable filtration products



"KiOfine-CG[®]" (KITOZINE) is made up of two types of polysaccharide. It forms a consistent suspension, which can be easily introduced upon settling in the case of musts clarification, or at the end of fermentation, in the case of fining. It is stable and can be stored in barrels with no particular conditioning. It is a fine, odourless and colourless powder. The product is insoluble in musts and wines, in which it quickly forms a sediment taking with it targeted undesired ingredients. It offers an innovative natural alternative to the use of products that may be allergenic and/or based on proteins of animal origin (casein, albumin, etc.). An auxiliary to wine or must, it improves their clearness (clarification, colloidal stability), improves filterability and refines the organoleptic characteristics of the wine by reducing astringency, dryness and bitterness.

The "EPL" (OENOFrance) yeast protein extract has been developed with the same aim, to provide a non-allergenic alternative for the fining of wines. To prevent consumers from suffering allergies or food intolerance, a European directive makes it compulsory to label allergenic foodstuffs, including alcoholic drinks, favouring the use of egg albumin fining proteins or similar, gelatins and/or food glues. Upon coming into contact with wine, "EPL" coagulates, forming flakes which, as they grow, carry away the fine residual particles responsible for damaging wine. The glue is then eliminated through decanting and/or filtration. Certain yeast proteins contained in EPL also react to the most reactive tannins, enabling the astringency of the wine to be diminished. The result is greater clearness, stabilization and an improvement in the taste of the wine.

The three-dimensional labyrinth-structured filter plate (BEGEROW) combines ultra-pure cellulose with a unique structure which requires no anorganic components for sterile filtering. Losses due to draining are limited to 20% and rinsing and backwashing performance improved. The filtering cellulose is 100% biodegradable. This natural filtration has no influence on colour: the aroma, taste and new standards for microbiological safety and external hygiene are respected.

. Faster laboratory measurements and simplified operations for managing cellar equipment

Using optical measurements, the "MT01" (MASELLI MISURE) monitors changes in the phenolic maturity of mixed grape juices directly in the laboratory. The principle employed is that of a spectral analysis via the diffuse reflectance of opaque liquids containing particles in suspension. The values of the reflectance spectrum are extrapolated to all frequencies, then interpreted, allowing for the fast assessment of indices of phenolic maturity (potential or total anthocyanins, index of total polyphenols and shade or index of maturity of red grapes). The measurements taken require neither a reagent nor maceration time.

When working in the cellar, wine makers are subject to pressing programming constraints which can often be seen as being too complex. With a view to meeting the needs of private cellars, the new "Organ[®]" (BUCHER VASLIN) principle uses nothing more than the press trough to obtain regular images of draining, for the management of draining and pressing cycles, and to precisely detect the juice load so as to define the drainage level.

The outer door for tapered tanks in oak (SEGUIM MOREAU) is notable for being located at the bottom of the tank and thus capable of satisfying sanitary constraints relating to barrel hygiene and the optimization of decanting operations. Made from stainless steel, it is assembled in a sandwich-like manner requiring neither screws nor bolts. Set flush, the door sill has no edge, allowing for precise and full decanting without the need to enter the tank, making for improved ergonomics and greater safety during such activities.

4. The fourth trend relates to the sectors of bottling, packaging and the analytical monitoring of wine quality.

. Low-cost, environmentally friendly cleaning of bottling machines

This is one of the key priorities for GAI FRANCE with its bottling machine sterilization system. The system employs "false bottles" which, by simulating the presence of a bottle, allow for the creation of a circuit that is closed to the washing fluid. Retracted during filling operations but placed in the position of the bottles during cleaning, the false bottles, create a closed circuit for the passage of fluids throughout all parts of the bottling machine, plus backwashing, unlike open washing systems. The combination of ozonated water with this mechanical action



offers environmental benefits in terms of hygiene for the destruction of contaminating microorganisms from the bottling chain. This offers an alternative to standard cleaning techniques employing water and acid.

. **Guaranteeing the quality of wine samples before shipping** is now possible thanks to a manual device (WIT) which allows for the packaging of wine drawn from a bottle. This piece of apparatus allows the grower to package their wines themselves on the domain, in 12 samples of 6cl per bottle, depending on need, while maintaining the characteristics of the wine, by inerting it under a controlled atmosphere during repackaging. The oenological aspect of the wine is stabilized. No motor or electricity are used, only the pressure of the gas. The sample produced from the bottle in small quantities is faithful to the packaged wine, with the guarantee of maximum protection, away from any potential contact with an atmosphere rich in oxygen. Sampling costs are reduced.

. **Easy-to-use, environmentally friendly packaging**

Mono-material (MAUBRAC) packaging makes it possible to group 6 bottles laid flat and insulate them from bumps, vibrations, light and dust, in a cardboard container formed of a bending template employing neither glue nor pasted strips, with only half the amount of adhesive required for closure. It is 100% recyclable, compostable and biodegradable. Once the consumer gets it home, it opens out fully straight away, making it ready for recycling. In addition, it costs less than a single-row, six-bottle slotted box.

To close these awards,

. **The development of non-invasive analyzers;** such as those already mentioned and honoured for portable spectrometry (PELLENC) and fluorometry (FORCE A) devices, the quick laboratory-based reflectance system (MASELLI MISURE) while being fast is invasive, clearly characterizes the most striking sector of the innovations featured in these awards.

One can add to these the "PreSens Fibox 3 LCD" trace analyzer, marketed by NOMACORC. This device allows for the measurement, using luminescence and in a non-invasive, non-destructive way, of the total concentration of oxygen in a bottle of wine. It is made up of an oxygen analyzer equipped with an optical fibre that channels the light to a chip that is reactive to oxygen. The corresponding luminescence of the sensor indicator is then retransmitted to the analyzer, via an optical fibre. The light emitted is directly proportional to the concentration of oxygen present around the sensor. No chemical reaction is required to determine the concentration of oxygen, unlike with the electro-chemical methods used elsewhere. This technique allows for the fast and precise control of all individual operations within the process of wine bottling.