gelLITE manual

Contents

Chapter One- Introduction

The gelLITE system supports multiple applications including DNA/RNA gel imaging such as EtBr, SYBR Gold, UltraSafe Blue, RunSAFE and visible stained gels i.e. Coomassie blue and silver stain.

The gelLITE gel imaging system is a dedicated UV transilluminator-based system with a small footprint. The gelLITE image capture software genePIX has been designed for ease of use and is application driven.

gelLITE is the perfect choice for a low budget gel documentation system. It features a compact darkroom which has a sliding front door and an internal white light.

1.1 Applications supported

Transilluminator UV	White Light Pad	Blue LED Transilluminator
Ethidium Bromide RunSAFE SYBR Green SYBR Gold SYBR Safe Gel Green Gel Red RubyPRO SYPRO Ruby UltraSafe Blue	Coomassie blue stain Copper stain Zinc stain Silver stain	RunSAFE GelGreen SYBR Gold SYBR Green SYBR Safe UltraSafe Blue

1.2 Hardware

1.2.1 Specification

Camera	5.0MP, 12/16 bit
Filter holder	Yes (UV filter as standard)
Max gel size	20x20cm
Data types	SGD, BMP, TIFF and JPEG
CMOS resolution	5.0M pixels
Image storage	USB, hard disk and network capabilities
Image enhancements	Annotation, rotation, inversion and many more
Illumination	Slide in and out UV transilluminator, Epi white LED light. Blue LED transilluminator

1.2.2 System components

CAMERA
CMOS Digital camera
- USB2 connection

LENS
Superior zoom lens for exceptional image quality

FILTER DRAWER
Use a range of filters for extensive choice of fluorescent applications

SAFETY SWITCH
Protects from accidental UV exposure when opening the door

INTERNAL WHITE LIGHT
For sample positioning and focusing

SLIDING DOOR
Space saving sliding door

TRANSILLUMINATOR (option)
For UV, visible light and blue light
- UV transilluminator slides in and out of darkroom
- Blue LED light (Ultraslim LED)
  - sits on a slide in and out tray

1.2.2.1 Darkroom

The darkroom has a sliding door. The darkroom features:
- Slide out mid wave 302nm UV transilluminator
- Internal LED white light
- Safety switch to protect from accidental UV exposure

1.2.2.2 UV transilluminator

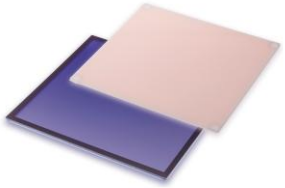
The UV transilluminator will excite many fluorescent stains such as Ethidium bromide, RunSAFE, SYBR™ stains, Gel Red™. The standard wavelength is 302nm. The transilluminator can be slid easily in and out of the cabinet.

1.2.2.3 Filter Draw

Interchange a range of filters for extensive choice of fluorescent applications.

1.2.3 Accessories

1.2.3.1 Blue and Visible light converters



Thistle Scientific offer blue and visible light converters that can be placed on top of the UV transilluminator for imaging DNA gels stained with fluorescent stains such as RunSAFE, SYBR Safe, Gold and Green, GelGreen and UltraSafe blue as well as protein gels stained with colorimetric stains such as Coomassie and Silver stains.

1.2.3.2 proBLUEVIEW transilluminator

The proBLUEVIEW transilluminator is ideal for safely imaging DNA gels stained with fluorescent stains such as RunSAFE, SYBR Safe, Gold and Green, GelGreen and UltraSafe blue as well as protein gels stained with Coomassie, Silver stains.

1.2.3.3 Thermal printer

You may connect a thermal printer CSL-PRINTUSB Mitsubishi USB Thermal Printer P95DW directly to the PC/laptop and install the software following manufacturer recommendation to print straight after image acquisition.

1.2.3.4 Analysis software

The gelLITE system is supplied with a copy of geneQUANT analysis software from Thistle Scientific. This may be loaded on a PC of your choice from the USB memory stick supplied with the system.

1.2.4 Set-up

Please refer to the Installation quick guide on how to set up the camera and darkroom.

1.2.4.1 Installing genePIX image capture software

1.2.4.2 Minimum system requirements

genePIX can operate on the following Operating Systems Windows XP Professional SP3 (32 bit version only) or Windows 7 Professional, Window 8 Professional and Window 10 Professional.

Please note that Home versions of Windows operating systems are not supported.

1.2.4.3 Software Installation

This section provides information regarding the installation of genePIX image capture software.

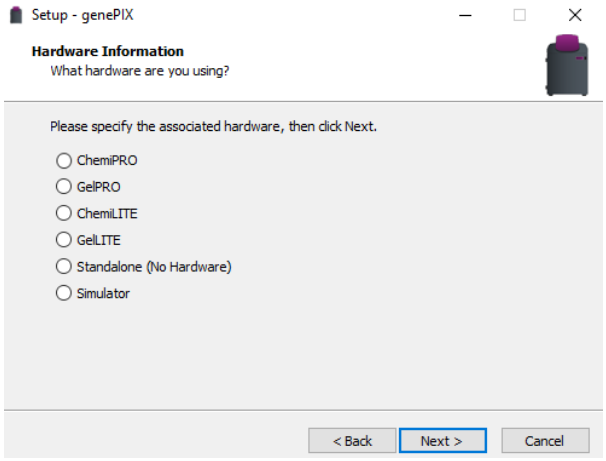
You will need to install the software from an account that has Administrator rights.
Installation is performed in the following sequence

1. Hardware Information
2. Select destination location
3. Select Start Menu Folder
4. Device Driver Installation Wizard

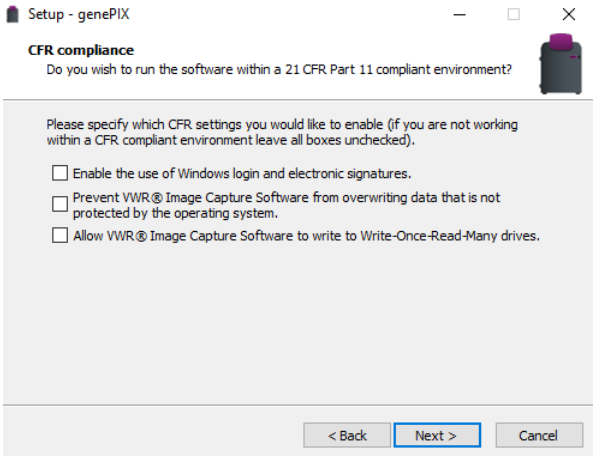
1.2.4.4 Installation of Hardware Information

Insert the USB memory stick supplied with the system and install and run the genePIX set-up program on a PC/laptop.

Click ‘Next’
Select from the list the hardware that you have then click ‘Next’

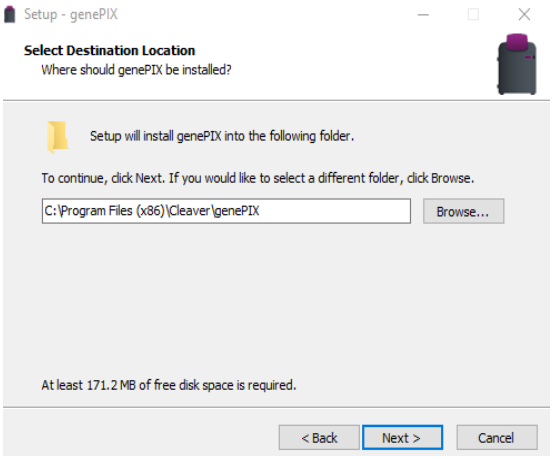


Specify CFR settings you would like to enable. If you are not working within a CFR compliant environment leave all boxes unchecked. Click ‘Next’



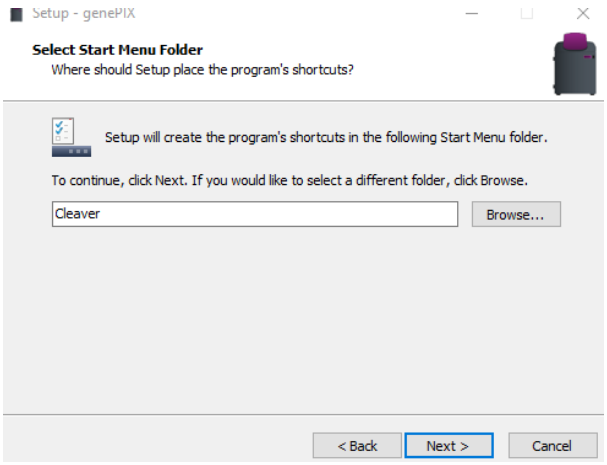
1.2.4.5 Select Destination Location

Please select the folder in which you would like genePIX to be installed. Select Browse to explore more folder options. Click ‘Next’

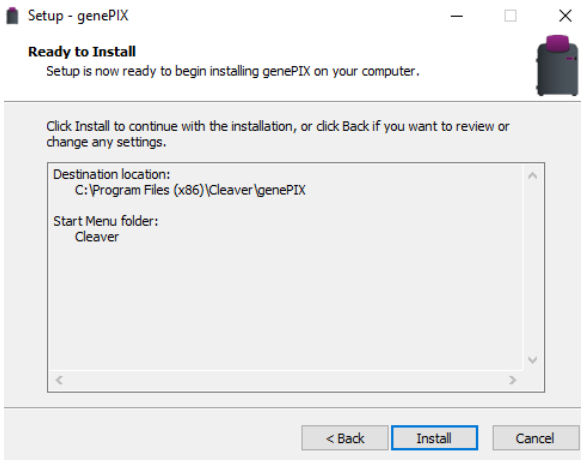


1.2.4.6 Select Start Menu Folder

Please select where you would like to create the shortcuts for the program. To select a different folder click the browse button. Click ‘Next’.

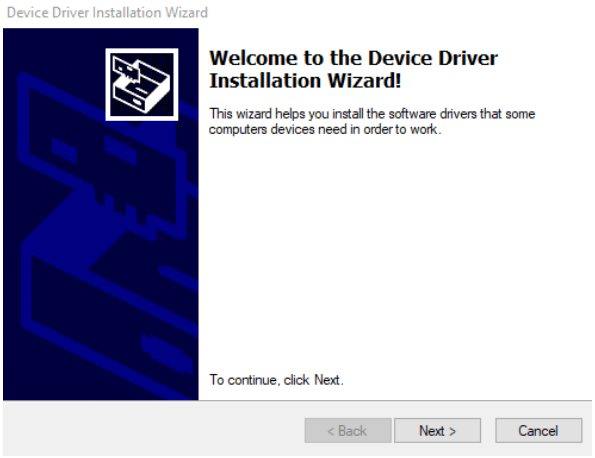


The software is now ready to install. Click ‘Install’ to continue the Installation process. Click ‘Finish’ to complete the software set up.



1.2.4.7 Device Driver Installation Wizard

This wizard will now install the software drivers that some computer devices need in order to complete the installation. Click ‘Next’.



Click ’Finish’ to complete the Device Driver Installation Wizard.

1.3 Enabling secure user accounts

To enable a secure user account you must use your Microsoft Windows account log in. Secure user accounts provide you with the full functionality of the software but will only show the configurations set up by you or the Protocols which have been made public.

1.4 Setting up hardware

When using genePIX software for the first time or when you have purchased additional accessories such as converter screens you need to tell genePIX software this information.

To enter this information click on the 'View available hardware' icon from the home page. Once this information has been entered by selecting the appropriate buttons the selected items will turn purple. Ensure that you click Save.

Figure 1- Hardware page

1.5 Entering Personal Preferences

Every individual who logs on to a InGenius3 Instrument can create a customised set of Instrument settings, i.e. a profile, which reflects the nature of the work the individual normally undertakes and what they do with the test results

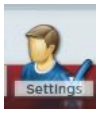
1. Select the **Settings** icon on the Home screen. This displays the User Preferences screen.

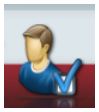
Figure 2- User Preferences General settings page

Set your preferences:

1.5.1 General Settings

Show labels on navigation buttons - checking this checkbox turns on the labels on the **Navigation** buttons, i.e.:

with labels 

without labels 

Classic View - checking this checkbox changes the display from **Standard View**, the default setting, to **Classic View**.

Prompt to save Protocols- if no longer wish to have this prompt displayed after an image is captured please un-check this checkbox.

Protocols backup- check the box to 'Enable the back-up of the protocol storage file'. select the number of backups and the time interval between back- ups (in days).

Screen Changing Prompts - enables you to turn the screen changing prompts which appear when you are setting up captures on or off. Two options are available:

- Anti-reflective screen - if the checkbox is checked, turns the prompt on (the default setting). If un-checked, turns the prompt off.
- Converter Screens - if the checkbox is checked, turns the prompt on (the default setting). If un-checked, turns the prompt off.

Annotation Handle Size Defaults- checkbox to increase annotation handle size if using a touch screen.

1.5.2 Report Settings

Figure 3- User Preferences Report setting screen

Enables you to pre-set some report defaults, this is useful where you are doing repetitive tests and want the same type of report for each test. The settable options are:

Full Report - checking this checkbox sets the Instrument to generate a Full Report for each test. The Full Report content can be controlled using the additional checkboxes, check to include the feature:

- Image
- File Description

- Capture Properties

Basic Report - checking this checkbox sets the Instrument to generate a Basic Report for each test. Additional features are:

- Basic Report Image Only - if the checkbox is checked, the printed report contains only the captured image for the test. If not checked, the report contains the image plus some basic information, e.g. filename / username / date / time / sample / filter, etc.

- Preview Before Printing - if the checkbox is checked, the screen displays a preview of the report before it is printed. If not checked, the report is printed without a preview being displayed.

- **Quick Quant Report settings**- select the analysis report setting for all your images
  - Select to include or exclude full report details
  - Displayed results only, incidence or quantity calibration results
  - Export includes headers

Logging Defaults

- **Increase Logging level**-this will permit Thistle Support to access more information on how the software is running on your instrument.

1.5.3 Printer Settings

Enables you to select a printer and set printer preferences for your selected printer, generally these will only be settable for the current session. The options available to you in Printer Settings will vary based on your operating system and printer make/model.

Figure 4- User Preferences Printer settings page

1.5.4 System settings

Figure 5- User Preferences System settings page

Enables you to reset Lens defaults and to perform a Dynamic Fielding operation. The genePIX Software will then apply this default Dynamic Fielding data set to your captured images when you select the **Use Dynamic Fielding** checkbox in the **Dynamic Fielding** box on a Sample Positioning screen.

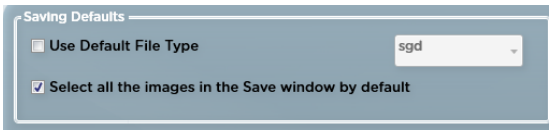
If you select the **Reset Dynamic Field Data** button the following pop-up message is displayed:

Figure 6- Reset Dynamic Field data message pop-up

- Select the **Yes** button to perform a Dynamic Fielding operation. Follow the onscreen prompts.
- Select the **No** button to cancel.

1.5.5 Saving Defaults

- Select the default file type for saving images. The current default is .sgd file format.
  Check the box to select al images in the save window by default.



- **Autosave settings**- Check to autosave captured images. Once selected use the 'Browse' button to navigate to the location in which you would like the images to be saved to. Select the name format for the images to be saved using the drop down menu.

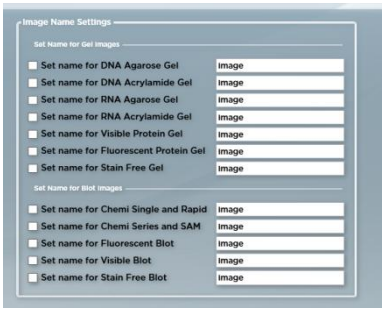
1.5.6 Save As settings

- Select between extended or classical window (older version of 'save as' screen)

- From the drop down menus select the default file format for export-choose from TIFF, BMP and JPEG. Select the default DPI and the bit depth from the drop down menus.

- Check the box to select all images in the 'save as' window by default.

- **Image name settings-** You can enter a name for each type of gel capture and for each type of blot image captured in genePIX to automatically use the entered name when exporting or saving that type of image.



6. To save any changes you make, select the **Save** icon . If you attempt to navigate away from the User Preferences screen without first saving the changes, the following pop-up message is displayed:

Figure 6-Save changes message pop-up

7. Select the icon to return to the Home screen.

Chapter Two- Auto Capture and Manual Image Acquisition

2.0 Auto Capture

Once the genePIX software has started up the home screen will appear. At first start up the genePIX software defaults to standard view. The display can be changed from Standard View to Classic View on the user Preferences screen.

Standard Screen

The basis of auto capture mode is a series of steps that form a structured workflow. The workflow is very easy to navigate through by using the green bouncing arrow present in the bottom right hand corner of the screen to move forward to the next screen (**Figure 7**). The grey status bar shows the progress of the workflow, select any of the icons to move between any of the stages that make up the workflow (**Figure 8**).

Figure 7- Navigation arrow

Figure 8- Workflow status bar

The first step of the workflow is Sample Selection followed by Dye Selection, Protocol Selection and Sample Positioning. The final stage is the Capture screen.

2.0.1 Sample Selection

Select from Gels, blots or manual capture from the home screen.

2.0.2 Dye Selection

genePIX software has an extensive database containing a vast list of dyes covering a variety of applications from fluorescence, chemiluminescence, chemifluorescence and visible stains (N.B. gelLITE cannot capture chemiluminescence or chemifluorescence).

2.0.3 Protocol selection

genePIX software has an extensive database which calculates the optimal imaging conditions for your sample based on the excitation and emission curves of the majority of dyes currently commercially available.

2.0.4 Sample Positioning

The sample positioning screen shows a live image of your sample.

2.0.5 Capture screen

The capture screen offers a wide range of functions including the ability to save, print, edit images and analyse the captured image (geneQUANT is required).

The captured image appears in the main window with the summary of the protocol used present on the right hand side.

2.1 Capturing an image of an agarose EtBr or similar gel

(For rapid capture see Quick Guide-Capture)

Step One

Select Auto Capture from the home screen.

Step Two

From the home screen select the following DNA Agarose.

Step Three

From Dye Selection screen select the dye that you are using either from your recent selections only or by searching for a dye (N.B. untick recent selections only to search the full list).

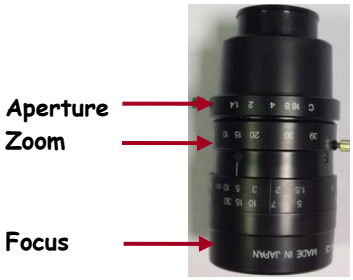
Step Four

Check the ‘Select Light and Filter box’ to see the best imaging condition for your hardware set-up.

To see more options check the ‘ More Options’ box. To view the non-UV protocols check the ‘Non-UV protocols only’ box.

Step Five

Place your sample on top of the transilluminator and close the door. The Sample Positioning screen will allow you to manually adjust the Lens controls (focus, zoom and iris settings).



N.B. Opening the aperture too far may result in areas of the sample being saturated, generating a very bright image.

If you wish to perform EDR, please check the EDR box.

Step Six

The captured image will appear in the main window. The image can now be saved in various file formats (.sgd, TIFF, JPG and BMP) or printed. You can also export the image to geneQUANT analysis software.


Save


Print


geneQUANT

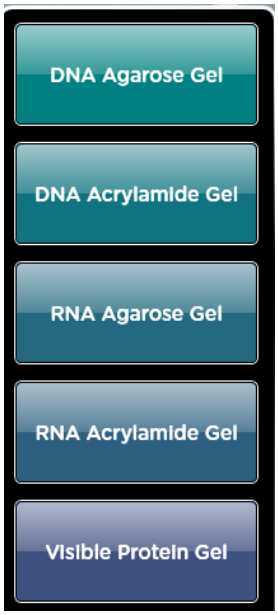
2.2 Capturing an Image of a protein gel (Coomassie, silver stained) or other white light image (colony plate, autorad, microtitre plate etc.)

Step One

Select Auto Capture from the home screen.

Step Two

From the Sample Selection screen select the following Gel as Sample Format, the sample type is Protein and then select that your gel is visibly stained.



Step Three

From Dye Selection screen select the dye that you are using either from your recent selections only or by searching for a dye (N.B. untick recent selections only to search the full list).

Step Four

Check the 'Select Light and Filter box' to see the best imaging condition for your hardware set-up

Step Five

If you have a white light converter then place your sample on top of the converter then place the converter on top of the transilluminator and close the door.

The Sample Positioning screen will allow you to manually adjust the Lens controls (focus, zoom and iris settings).

N.B. Opening the aperture too far may result in areas of the sample being saturated, generating a very bright image.

If you wish to perform EDR, please check the EDR box.

Step Six

The captured image will appear in the main window. The image can now be saved in various file formats (.sgd, TIFF, JPG and BMP) or printed. You can also export the image to geneQUANT analysis software.


Save


Print


geneQUANT

To ensure that the image you are capturing is not saturated select the 'Show Saturation button' (**Figure 9**). Saturation will only show when the slider bars have been moved to each end of the brightness/contrast slider. Over-exposed (saturated) white bands will show red and over-exposed black areas in blue (**Figure 10**).

Figure 9- Show Saturation button

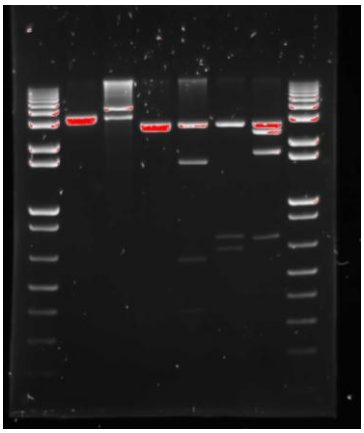


Figure 10- Image of a gel showing saturation. The bands coloured red show that these bands are saturated

genePIX software also has the ability to dynamic field. The dynamic field function is based on powerful algorithms which corrects for uneven illumination. This results in an image with a flat, even background whilst maintaining GLP compliance. To Dynamic field check the box for dynamic fielding (**Figure 11**) and then follow the on-screen instructions (**Figure 12**).

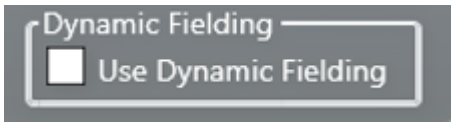
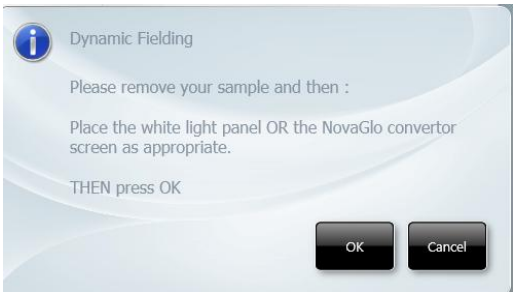


Figure 11- Dynamic Fielding check box

Depending on which type of sample (UV, epi lights or transilluminator white light) you would like to Dynamic field you may get either of the bottom two messages shown below.



Or

Figure 12- Dynamic Fielding Dialog boxes

To freeze the image press (if you have a touch screen monitor) or click the Capture button (**Figure 13**). The image is no longer Live. If you wish to abort capture you can press the 'Stop' button at any time (**Figure 13**).

Figure 13- Capture and Stop buttons

2.3 Manual Capture

Manual capture offers you the ability to take complete control of every function of the system. The manual mode is particularly useful for the more unusual applications and if you have known imaging parameters that you wish to use.

Once Manual capture has been selected the camera is live. To be able to position your sample the appropriate lighting and filter combination need to be selected. Both the lighting and filter menus have a drop-down menu where you can select from all the available lighting and filters present in your system (**Figure 14**).

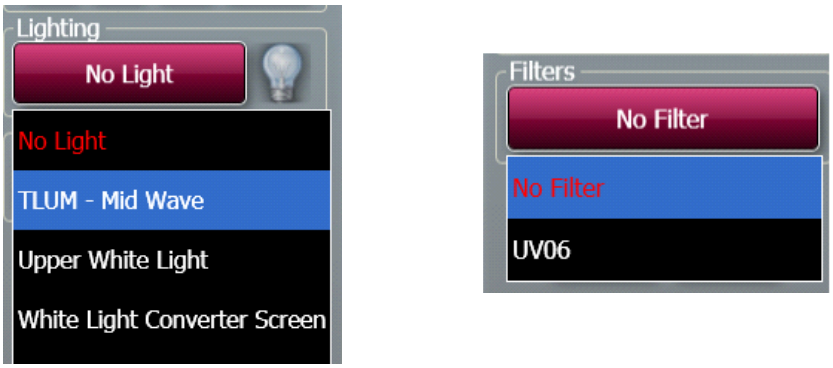


Figure 14 – Filter/Light selection

Once you have selected a light and filter you need to set the exposure time. Use the +/- buttons to increase or decrease the exposure time (**Figure 15**). The exposure time can be entered manually by typing a number directly into the box. Please enter the exposure time in the following format hours:minutes:seconds:milliseconds (h:m:s:ms). There is a default exposure time of 80ms for fluorescent gels.

Figure 15 - Setting Exposure times

Auto Capture is designed to capture the maximum available grey scales of the sample without actually allowing saturation. Therefore, this feature is ideal for quantifying data (**Figure 16**).

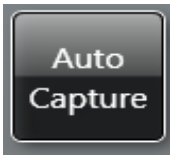


Figure 16- Auto Capture button

To ensure that the image you are capturing is not saturated select the 'Show Saturation button' (**Figure 17**). Saturation will only show when the slider bars have been moved to each end of the brightness/contrast slider. Over-exposed (saturated) white bands will show red and over-exposed black areas in blue (**Figure 18**).

Figure 17- Show Saturation button

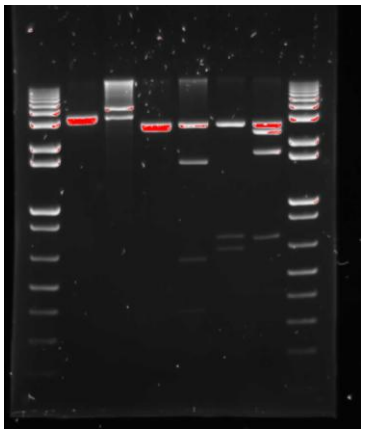


Figure 18- Image of a gel showing saturation
The bands coloured red show that these bands are saturated

genePIX software also has the ability to Dynamic field. The dynamic field function is based on powerful algorithms which corrects for uneven illumination. This results in an image with a flat, even background whilst maintaining GLP compliance. To Dynamic field check the box for dynamic fielding (**Figure 19**) and then follow the on-screen instructions (**Figure 20**).

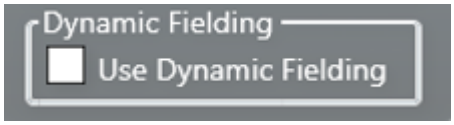
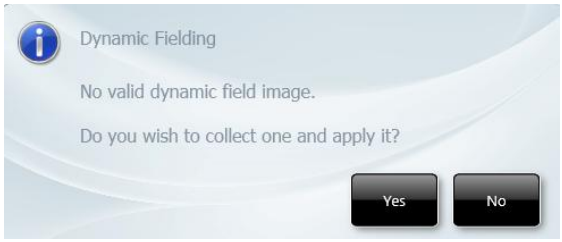
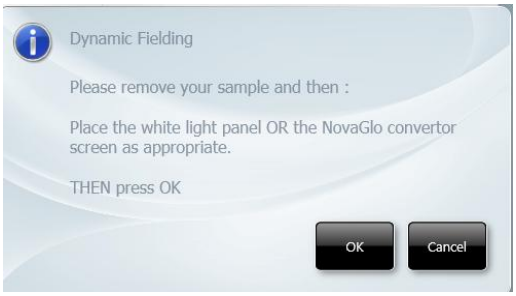


Figure 19- Dynamic Fielding check box

Depending on which type of sample (UV, epi lights or transilluminator white light) you would like to Dynamic field you may get either of the bottom two messages shown below.





Or

Figure 20- Dynamic fielding Dialog boxes

To freeze the image press (if you have a touch screen monitor) or click the Capture button (**Figure 21**). The image is no longer Live. If you wish to abort capture you can press the 'Stop' button at any time (**Figure 21**).

Figure 21- Capture and Stop buttons

The histogram tool is very useful for illustrating the distribution of grey scales within the image (**Figure 22**). The level of grey scales produced is dependent on exposure time - up to 65536 grey scales will be displayed (**Figure 23).**

Figure 22- Manual Histogram tool button

Figure 23- Graphical representation of the number of greyscale levels captured.

The red lines on the histogram are moveable allowing you to adjust the brightness and contrast by using the histogram.
The slider bars present on the left hand side of the screen can be used to adjust the brightness and contrast of an image and to digitally zoom in or out (**Figure 24**). Adjust the brightness and contrast by moving the slider tabs up and down. To return to original settings press the reset button (green arrows). To zoom in move the slider bar towards the (+) sign and to zoom out move the slider bar towards the (–) sign.

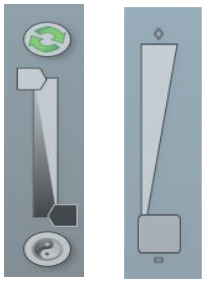


Figure 24- Manual capture slider bars for brightness and contrast and digital zoom

To view more information about the captured image select the image information icon. Once selected the pop up window will display information on dye, filter, light source, Iris F number, exposure time and the image size. The image information button also provides information on the range of black and white levels. You can also point the mouse arrow over a band and the black and white levels and XY coordinates appear in this box (**Figure 25**).

Figure 25- Image Information Icon

genePIX software can be used to set up custom protocols containing system settings (lighting, filter and camera settings) which can be repeated and retrieved at any time. These repeatable custom protocols are configurations, to save a Protocol select the following icon (refer to chapter 5 for more information on how to set up a Protocol).

Figure 26- Protocol Icon

The image pool present on the right hand side of the screen contains saved and unsaved images that have been recently captured in this session. The images outlined in red are images that have not been saved; images outlined in green are images which have been saved and the file name will be present (**Figure 27**).

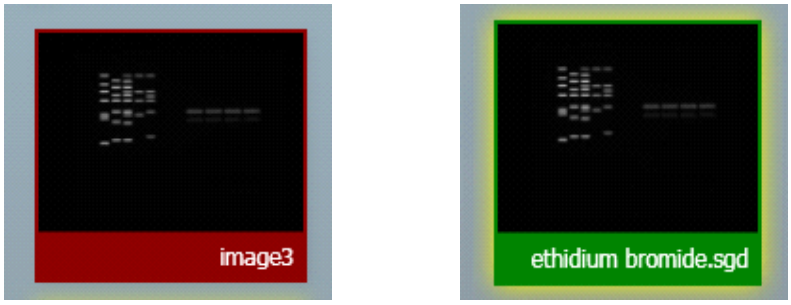


Figure 27- Saved and unsaved images

To remove an image from capture screen image pool, select the Close button. **N.B. This will remove the image from every image pool. If the image has not been saved the software will prompt you to save the image before removing it**.

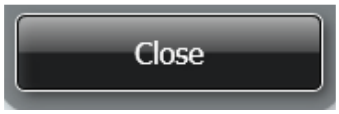


Figure 28- The Close button

The image pool also permits the user to select multiple images by checking the Multi Select Mode box (**Figure 29**).

Figure 29- Multi Select Mode check box

Chapter Three- Exporting, Saving and Printing Images

The most convenient way to archive or document the complete information about your experiments is to generate reports.

However, you may just want to export only your gel or blot image(s) for presentation or publication purposes.

This chapter describes all the ways you can export an image, save and print images.

3.1 Saving Images

Images captured with genePIX software can be saved in several formats. To save an image simply press (touch-screen) or click on the following icon (**Figure 30**).

Figure 30- Save icon

A dialog box will pop up where you can enter a file name for your image. You can also use the 'Save as type' drop down menu and select to save the image as a Data (*sgd), TIFF image file (*tif), Windows Bitmap image file (*bmp) or a JPEG image file (*jpg) (**Figure 31**).

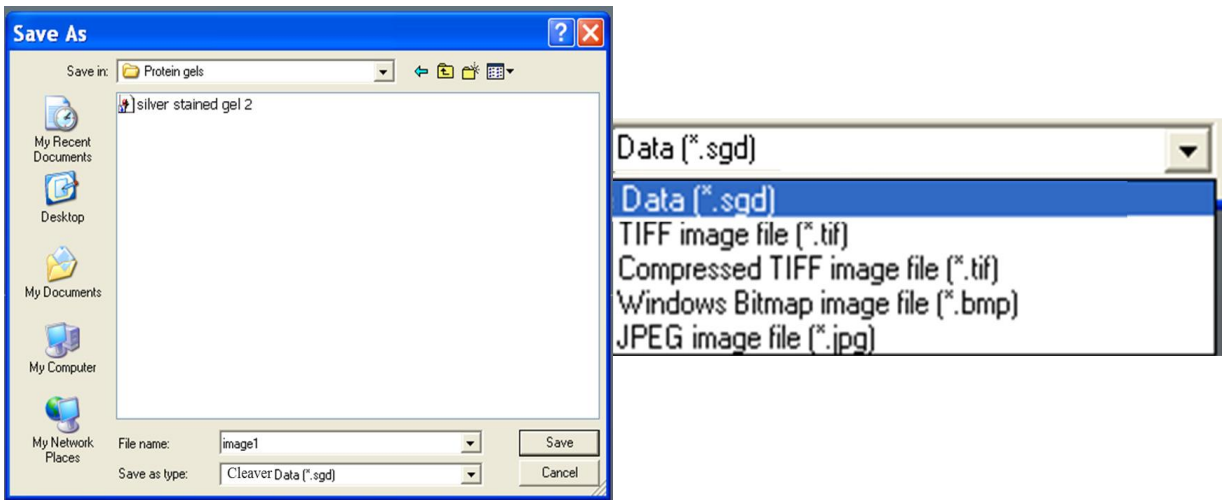


Figure 31- Saving dialog box

The default is set to Data (*.sgd) which is a secure file and GLP compliant. These files can only be opened or altered in Thistle Scientific software packages such as geneQUANT. SGD files contain all the capture information such as lighting, filter, exposure times and many more complex details i.e. the camera serial number.
If you have captured multiple images then you can select ‘Multi select mode’ and select all the images you wish to save (**Figure 32**).

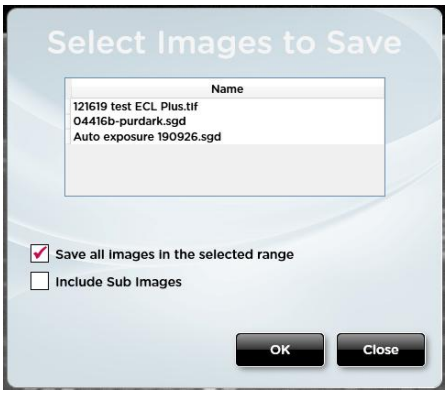


Figure 32- Saving multiple images dialog box

Pop-up box displays a list of the images to be saved. As a default setting the ‘save all images in the selected range’ is ticked. Select to also ‘include Sub Images’ if multiplexed or series capture images are being saved.

Select OK to continue to save images or select Close.

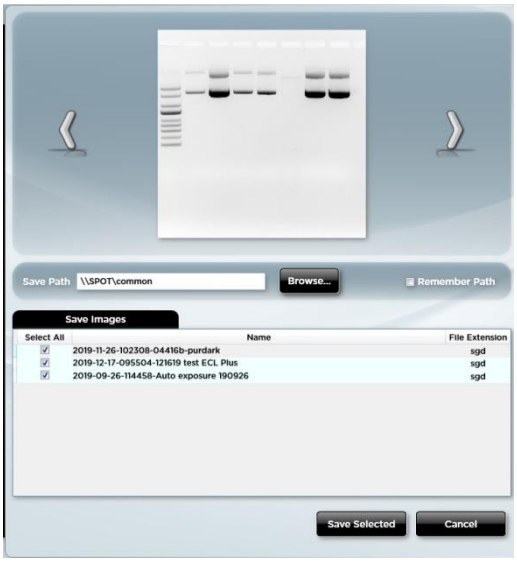


Figure 33- Saving multiple images dailog box 2

If ‘OK’ button has been selected then a second save screen will appear showing a preview image. Enter a save path by using the browse button. Check the box to ‘Remember the Path’ if saving images to the same location each time.

Note Save selected button will be greyed out until a ‘Save Path ‘has been entered.

Note Save selected button will be greyed out until a ‘Save Path ‘has been entered.

From the save screen the file name can be changed the default is set to the date and time the image was captured. To change the file name select the image from the list and type the new file name in the box.

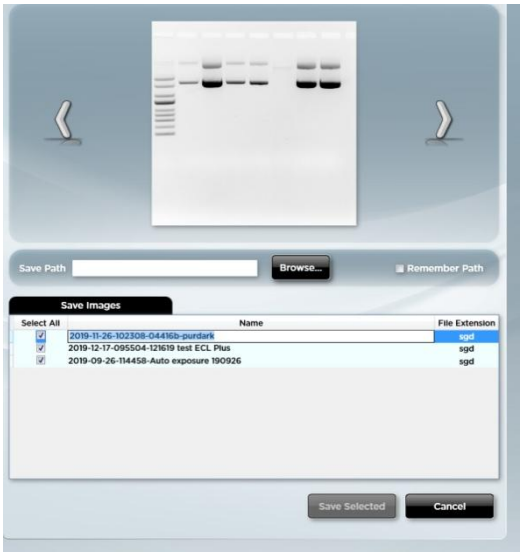


Figure 34- Changing file name

Select ‘Save Selected’ button 

to save your images in the Syngene file format .sgd.

3.2 Save As

Save As  feature in genePIX allows the user to save the image in the following file formats Tiff (16 bit uncompressed or 8 bit compressed. This This format is used when you require all the image data to be retained. This file option creates a larger file, but will allow you to analyse the image in other software packages), *.Bmp and *.Jpg (8 bit files you will therefore lose some quantitative data. This format should only be used for the export of visual information to

presentation or word processing software, such as Microsoft Powerpoint or Microsoft Word).

Figure 35- Save As dialog box

Select 

to continue to save images or select 

.

Figure 36- Save As dialog box 2

If ‘OK’ button has been selected then a second save screen will appear showing a preview image. Enter a save path by using the browse button. Check the box to ‘Remember the Path’ if saving images to the same location each time.

Note Save selected button will be greyed out until a ‘Save Path ‘has been entered.

From the save screen the file name can be changed the default is set to the date and time. To change the file name select the image from the list and type the new file name in the box. The file extension can be changed to any of the following formats .Tif,.bmp and .JPG. The DPI can also be altered from 96-1500 dpi and the bit depth from 8 bits to 16 bits using the drop down menus.

Select ‘Save Selected’ button 

to save your images in the file format of your choice.

3.3 Saving Annotations

Annotations can be saved as a .sgd file format. Select the Save/Load annotations icon to add annotations to an image from a saved .ANN file using the Load Annotation button (ANN. Annotation file) (**Figure 37**).

Figure 37- Saving Annotations icon

3.4 Printing Images

Images captured with genePIX software can be printed using a thermal printer or any other printer. To print an image you need to press (touch-screen) or click the following icon (**Figure 38**).

Figure 38- Print icon

A dialog box will appear showing a print preview. Select Print to print the image (**Figure 39**).

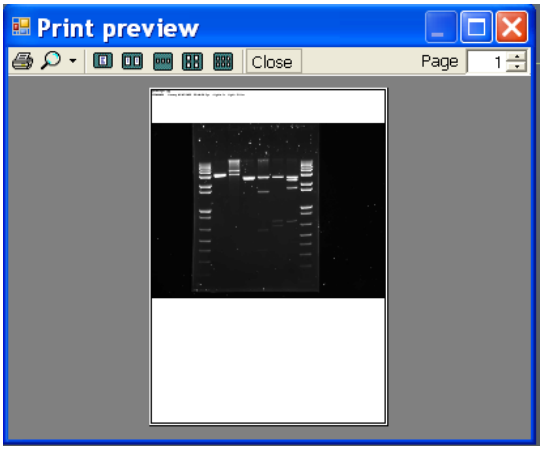


Figure 39- Print preview

3.5 Exporting Images to geneQUANT analysis software

.sgd file formats can be exported from genePIX to geneQUANT.

To export a captured or saved .sgd image simply select the 'open selected images in geneQUANT' button (**Figure 40**).
N.B .Tiff file formats can be opened in geneQUANT software using 'New (import) then browse for the image you wish to analyse.

Figure 40- Send to geneQUANT icon

Chapter Four- Browse, Edit and View Screens

4.1 Edit screen

The Edit screen offers a variety of functions ranging from image enhancement and 3D view to changing the resolution of the image for publication purposes (**Figure 41)**

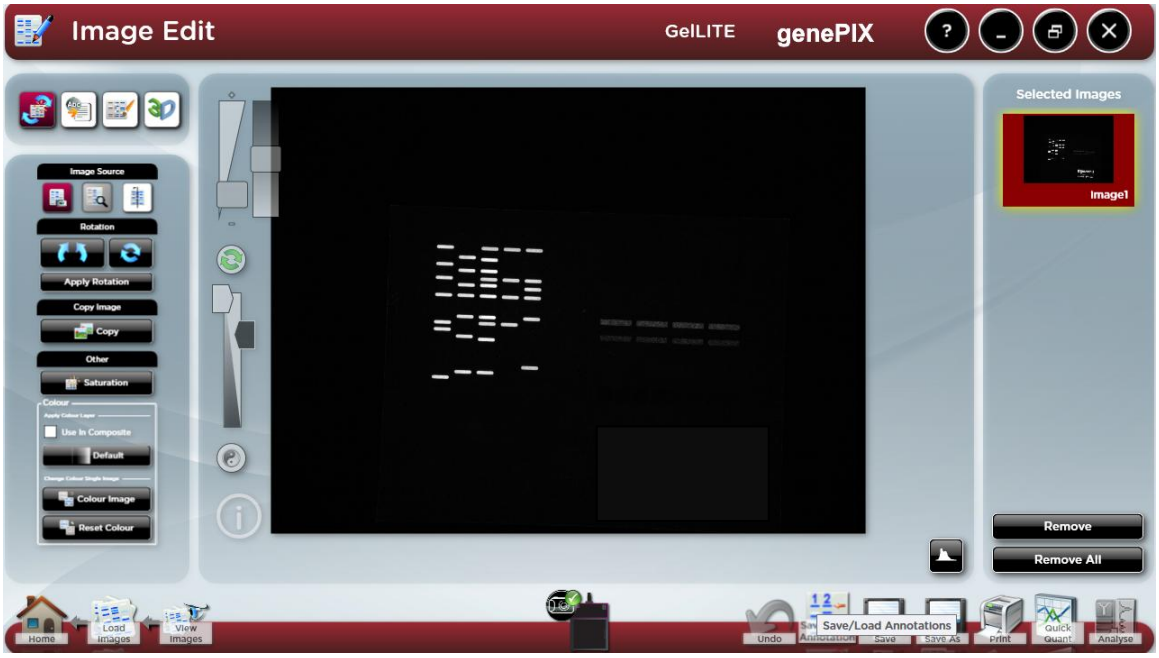


Figure 41- Image Edit screen

The Edit screen has a panel of 4 buttons present on the top left hand side of the screen allowing you to switch between annotation, enhancement tools and 3D view (**Figure 42**).

Figure 42- Edit **screen General, annotation, enhancement and 3D icons**
The icons from left to right are general, annotation, enhancement and 3D.

4.2 General tools

The **General** option provides a range of basic image manipulation tools. The lower left hand pane of the **General** screen provides the following controls/functions:

Image Source
Rotation
Copy Image
Other

Note: Selected function buttons turn red. They stay red and the function remains active until the function button is re-selected.

Figure 43- General controls/functions

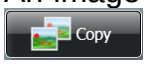
4.2.1 Image Source

As you make changes to an image file the genePIX software makes a copy of the file to which the changes are made. There are therefore two versions of the image file; the original unchanged image file, and the changed image file. The **Image Source** function allows you to view either of these two files. To view the unchanged file select the **View Original Image** button  . To view the changed file select the **View Processed Image** button  .

4.2.2 Rotation

Displayed images can be rotated freely by selecting the **Allow Rotation** button  . Once the image has been rotated the new image orientation can be fixed by selecting the **Allow Rotation** button a second time. Image orientation can be reset to its original position by selecting the **Reset Rotation** button  .

4.2.3 Copy Image

An image can be copied to the Windows Clipboard by selecting the **Copy** button 

. This allows you to paste the image into another package.

4.2.4 Other

The Other functions provided are **Saturation** and **Colour**.

The **Saturation** function can be used to check if areas of the image are going to be over-exposed; over-exposed white bands will be highlighted in red on the image, over-exposed black bands will be highlighted in blue on the image. This function is useful if the **Select AutoExpose Area** function has been used. Please note that saturated bands are not quantifiable. To use this function select the **Saturation** button 

.

The **Colour** function can be used to improve the appearance of an image by changing the colour of the coloured bands to produce a greater colour contrast, this can make seeing faint bands more visible. Select the **Default** button 

and select a new colour from the drop-down menu. To reject a colour and return to the original setting select **Default** from the drop down menu.

Figure 44- Other functions- default colour menu

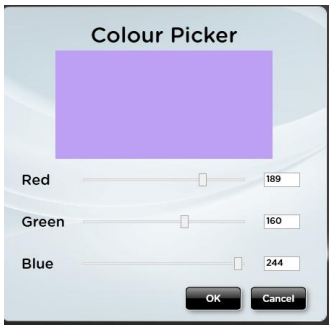
The **Default** function can also be used to applied a colour wash that emulates different dyes.

- Select the green colour wash to emulate a SYBR Green DNA gel.
- Select the yellow colour wash to emulate a SYBR Gold DNA gel.
- The orange-blue-red colour wash makes a protein gel appear silver, Coomassie blue and SYPRO red stained.

If the image being edited is a multiplex image, the colour change is applied to all of the individual exposure captures but not the composite image. To apply the colour change to the composite image as well check the **Use in Composite** checkbox.

Use the colour picker to add a custom colour to a single image. Select the 'Colour Image' button 

and then from the pop up use the slider bars to create a custom colour.

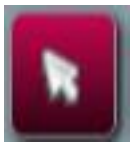


Press the 'Reset Colour' button  to remove the custom colour.

4.3 Annotation tools

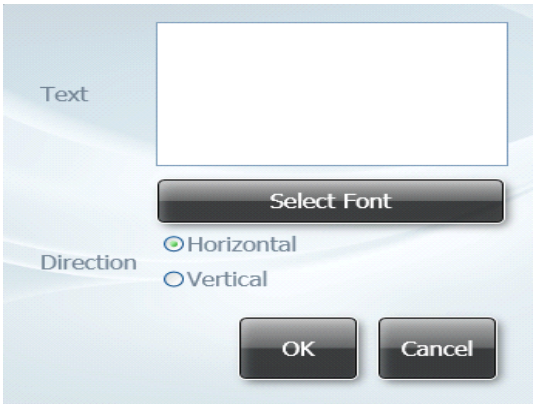
There are several annotation tools currently available with genePIX software. The annotation tools will appear when you select Annotation icon to access the Enhancement and 3D tools you will need to select the appropriate icon (**Figure 42**).

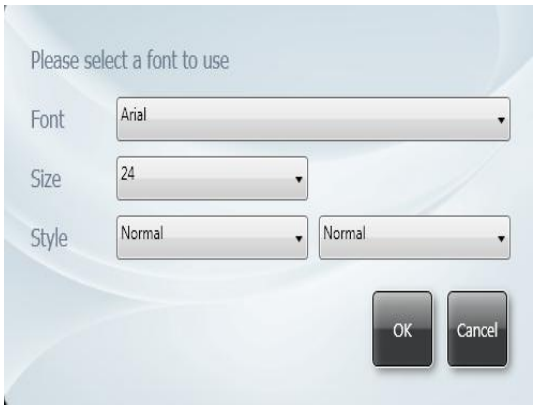
Figure 45- Annotation Tools



Use the mouse arrow as an selection tool

Use the Abc button to add text to your image. Simply click on the image where you wish to write. Now you can type your text directly onto the image. To edit the text, double click on it. A window will appear enabling selection of font, size and style. The text box can be dragged around the screen as can all the annotation.





This tool can be used when you wish to draw a filled shape. Press the Fill button then select the shape you wish to draw from the icons shown in figure 35.

To draw rectangles, circles, freehand shapes, lines and arrows click the appropriate icon shown below (**Figure 35**).

Figure 46- Draw icons

The colour of any annotation can be changed using the colour drop-down menu. **N.B.** When using the black and white thermal printer it is recommended to use white or black annotation for clarity (**Figure 46**).

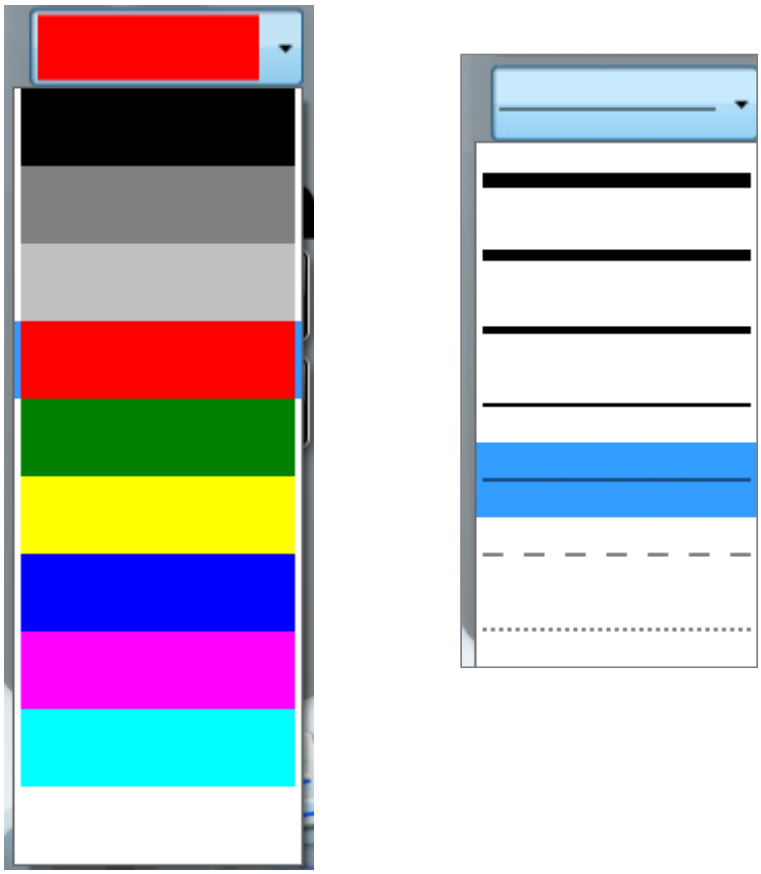


Figure 46- Select line and shape colour drop-down menu

The style of annotated objects i.e. the line thickness and style can be altered using the drop-down menu.

Any annotations made will be automatically saved when images are in SGD format. When saving in other formats, you must check the engrave box to ensure annotations are saved. See section 3.1 for more information on saving images.

To save any annotation that you have made to your image in a separate file that can be re-opened over another image, press on (touchscreen) or click the following icon (**Figure 47**).

Figure 47- Save/Load Annotations icon

When you have selected the icon the following dialog box will appear. Select to save, load or cancel (**Figure 48**).

Figure 48- Save/Load Annotations dialog box

4.4 Enhancement tools

The image enhancement tools allows the user to invert, smooth, sharpen, flip and crop the image (**Figure 42**).

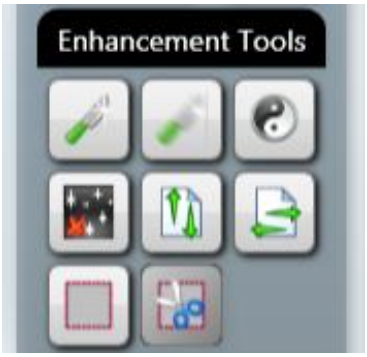
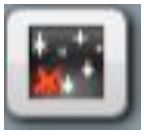


Figure 49- Image Enhancement tools

Click on this icon to apply a sharpening filter to your image. When this filter has been applied band edges should become more pronounced but you may also observe an increase in the graininess of the image.

Click on this icon to apply a smoothing filter. This is useful when the image has specks of dust or bubbles present. However, this will make bands appear less sharp.

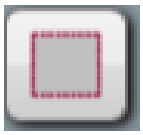
The Reversal icon will reverse the image to give black bands on a white background or vice versa. This icon is particularly useful when trying to see faint bands.



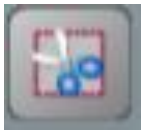
Speckle correction icon will remove white speckles or ‘hot pixels’ from the image.

Flip vertical will mirror the image on the vertical plane. This is useful if the sample has been placed in the cabinet the wrong way round.

Flip horizontal will mirror the image on the horizontal plane. This is useful if the sample has been placed in the cabinet the wrong way round.



Select icon allows you to select an area of interest within the captured image.



The crop icon will crop the selected area of interest and paste into a separate window; when used together the select and crop processes will reduce the image size.

4.5 3D View

3D view is a function which enables the user to see a 3D view of their image, revealing gel thickness and the constrast between peaks on a gel. The 3D view can be used with any sample type.

To turn on the 3D viewer select this icon. 

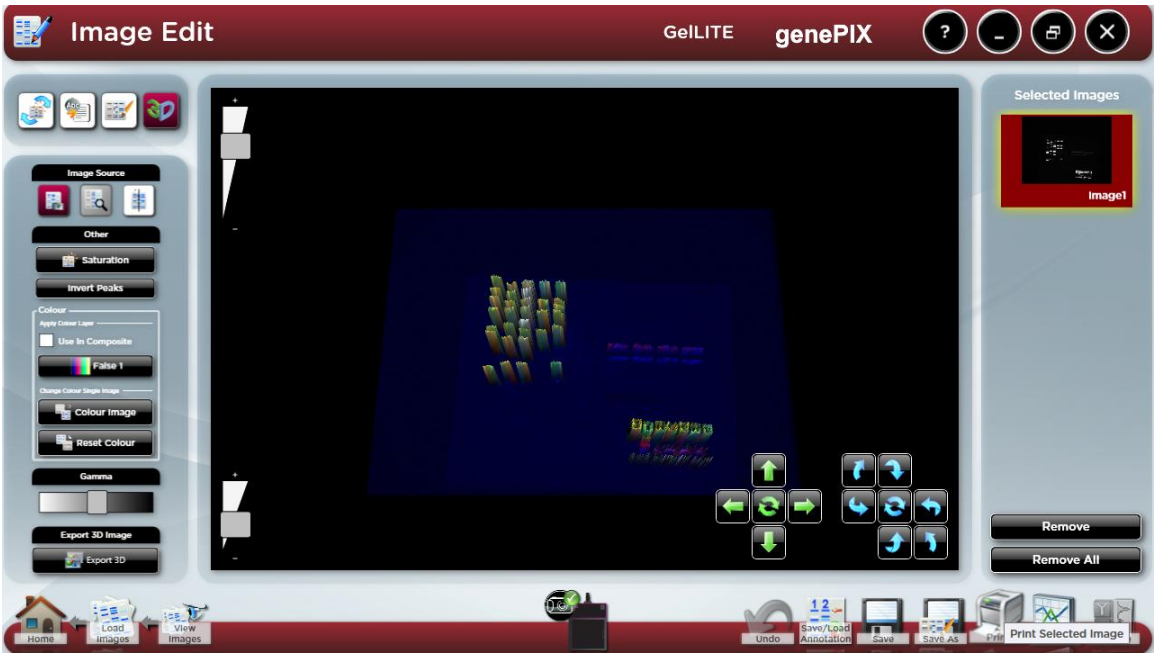
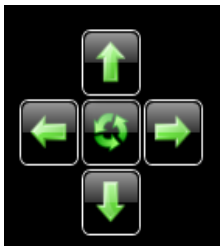


Figure 50- 3D View screen

To control the view use the following controls



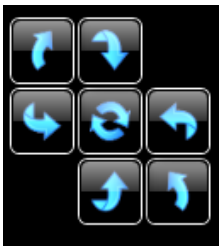


Figure 51- 3D View controls

Use the blue circles to rotate the image and the green arrows to move the image left to right and up and down the screen. The buttons in the middle reset to the original position.

The 3D image can also be controlled by clicking and dragging with a mouse to position as required.

Use the Gamma slider to adjust the gamma of the image to see fainter bands (**Figure 52**).

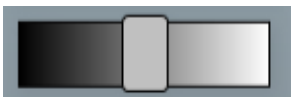


Figure 52- 3D View gamma slider

Adding a false colour wash can improve the contrast. Select the 'Default' button and from the menu select the colour wash you wish to apply to the 3D image (**Figure 53**).

The colour wash button can also be used to emulate different dyes, select the green colour wash to emulate a SYBR Green DNA gel, the yellow colour wash

imitates a SYBR Gold DNA gel. The Orange, blue and red makes a protein gel appear silver, Coomassie blue and SYPRO red stained respectively. The false colour can be used to better illustrate faint bands.

Figure 53- Colour Wash

The Image pool present on the right hand side of the Edit screen shows the images that you have brought into the Edit screen from the Browse screen or from any of the capture screens.

To remove any of the images from this pool simply select the 'Remove' button. If you wish to remove all the images from the image pool select the 'Remove All' button (**Figure 54**)

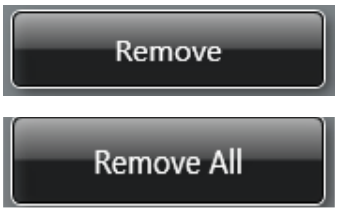


Figure 54- Remove image buttons

The selected image(s) can then be saved, printed, sent to the View screen for comparison or to the Edit screen for further enhancement (**Figure 48**).

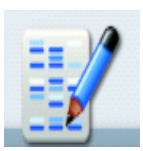
a)  **b**)  **c**)  **d**) 

Figure 55- Save, print, view and edit image icons
a) Save icon, **b)** print icon, **c)** View images icon and **d)** Edit screen icon
Single images can be sent to geneQUANT for analysis (**Figure 56**).

Figure 56- Send to geneQUANT icon

4.6 View Images Screen

The View Images screen allows you to view and compare the images that you have captured whether they are saved or unsaved and any images brought in from the Browse Images screen (**Figure 57**).

Figure 57- View Images Screen

The zoom slider can be used to increase or decrease the size of the image (**Figure 58**).

Figure 58- View Screen digital zoom slider bar
The View images screen also enables you to compare up to four images. To compare images simply highlight the images you wish to compare then select the icon with the magnifying glass (**Figure 59**).

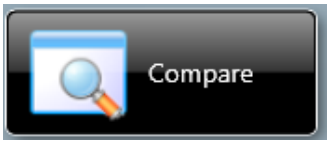


Figure 59- Change Layout icons

Once you have clicked the 'Change Layout' icon the following screen will appear **(Figure 60).**

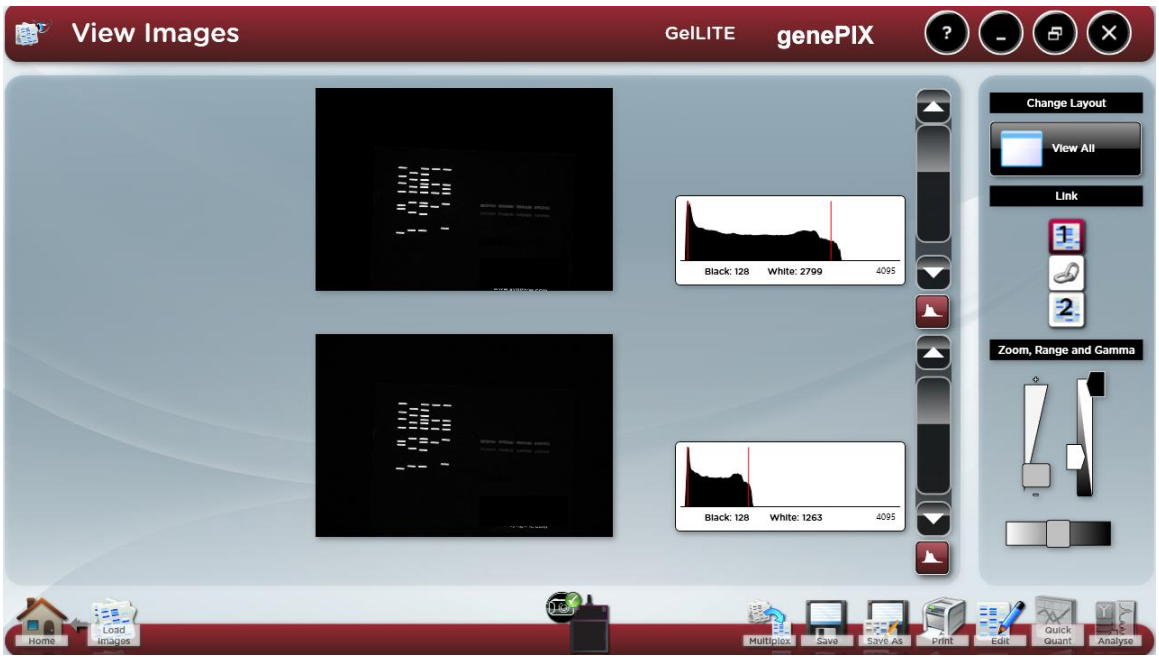


Figure 60- Change Layout Screen

The default setting is set to link all images that are being compared allowing the zoom and brightness and contrast all images to be altered to the same degree (**Figure 61**).

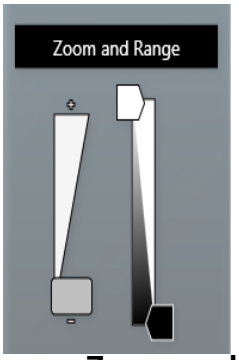


Figure 61- Change Layout screen Zoom and Range slider bars

To adjust the zoom setting of the image(s) use the slider on the left hand side. Move the slider bar towards the (+) to zoom in and towards the (–) to zoom out. To adjust the brightness and the contrast use the slider bar on the right hand side.

To alter the zoom, brightness and contrast of individual images the images will need to be unlinked. To do this select the numbered icon of the image you wish to alter under the Link heading (**Figure 62**). To link images again select the linked chains icon (**Figure 63**).

Figure 62- Linking and Unlinking images

The key identifies which image you have selected and the position of each of the images that you are comparing (**Figure 63**).

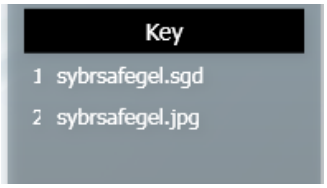


Figure 63- Change Layout screen image key

To exit from the comparison screen simply select the icon without the magnifying glass from the change layout heading**.**

4.7 Load Images screen

The Load images screen allows you to open files that are already saved on your computer and to open files from external devices such as USB keys.

Use the left hand side of the screen to explore folders on your computer. All images will be organised by date (**Figure 64**).

To select images simply click or press (touchscreen) on the image thumbnails which will turn green when selected. Then select the View images icon to compare or edit images.

Figure 64- Browse screen

Chapter Five- Protocols

genePIX software can be used to run specific applications with repeatable workflows and to design custom configurations with a wide variety of settings that are easily accessable, adaptable and re-usable at any time.

5.1 Saving Protocols

5.1.1 Saving Protocols in Auto Capture mode

Set up your Protocol by working through the following screens Sample selection, Dye selection, Protocol selection and Sample positioning. Once you have captured an image you can save this as a configuration by selecting the following icon (**Figure 65**).

Figure 65- Protocol Icon

A pop-up window will appear where you enter a name for the Protocol. You can at this point select to save the configuration as ‘Lock’ or ‘Make public’. A ‘locked’ Protocol means you cannot make any adjustments to the protocol .‘Make public’ Protocols allow you to share configurations with other users (**Figure 66**).

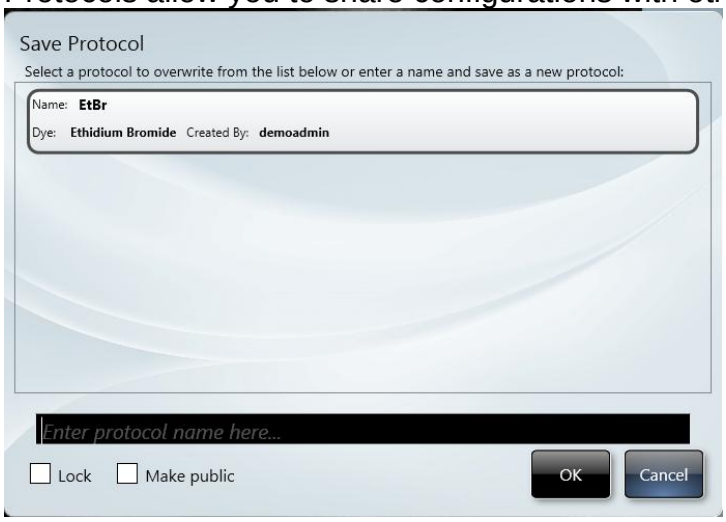


Figure 66- Save Protocol box

You can also modify an existing protocol by selecting the Protocol you wish to edit from the ‘Save Protocol’ dialog box.

5.1.2 Saving Protocols in Manual mode

Once you have selected the lighting and filter options you wish to use, position your sample so it is zoomed in and in focus then capture the image. Once you have captured an image select the Protocol icon (**Figure 65**).

Then enter a name for your configuration and select if you want to 'Lock' or 'Make public' the configuration (**Figure 66**).

5.1.3 Opening Protocols

From the home page you can open saved Protocols by simply pressing or selecting the configuration you wish to open. Once selected the notebook will enlarge (**Figure 67a**) enabling you to select whether to open the file (**Figure 67b**) or delete the file (**Figure 67c**).

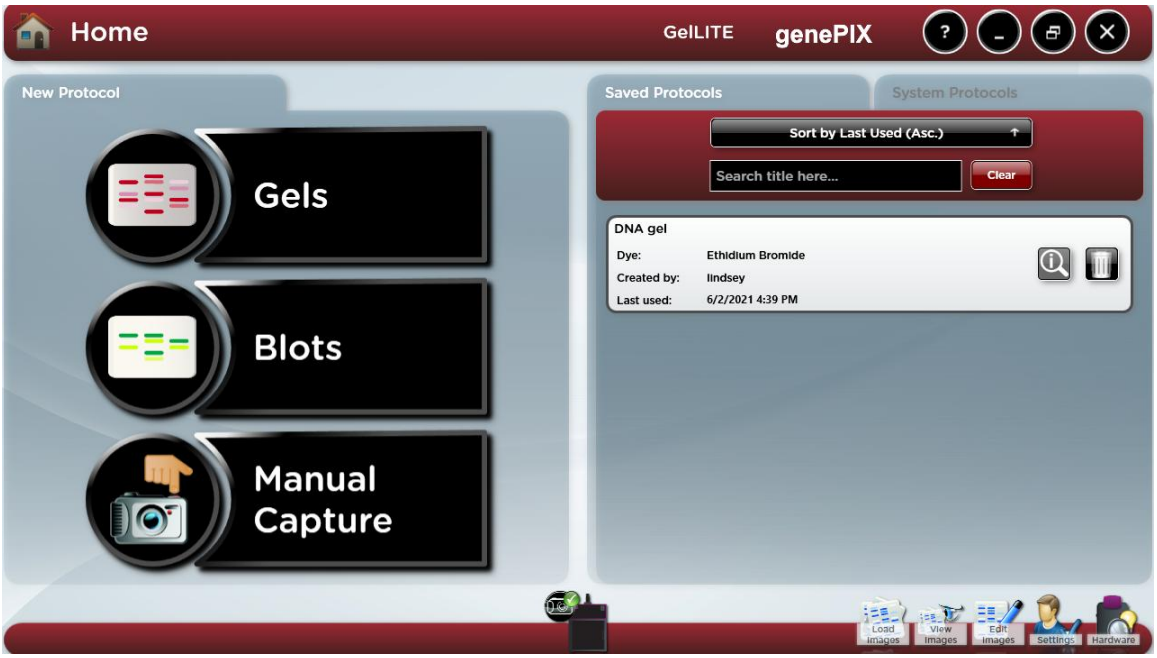


Figure 67- Opening User Protocols
a) Enlarged Protocol **b)** Open Protocol and **c)** Delete Protocol

Once the Protocol has been opened you will be taken to the Sample Positioning screen.

Chapter Six- Troubleshooting and General Information

If your dye/reagent is not listed then please contact info@thistlescientific.co.uk

6.1 Technical Information

genePIX software hardware installation guide

Please visit the Thistle Scientific website to download the gelLITE technical literature (This is also available on your genePIX USB memory stick).

Quick Guides

gelLITE Installation
gelLITE Image Capture

6.2 Technical Assistance

Thistle Scientific Ltd.
Unit 41,Somers Road Industrial Estate
Rugby
CV22 7DH
Tel: +44 (0)1788 565300
Fax: +44 (0)1788 552822
Email: info@thistlescientific.co.uk

6.3 Troubleshooting

PROBLEM	POSSIBLE CAUSE	SOLUTION
Camera not connected or not responding	Camera power cable not plugged in Software driver for the camera is missing	Make sure all cables are connected as shown in the Installation quick guide Install Camera driver Press the refresh button on the gelLITE icon
'Hardware not available'	You do not have the correct filter or lighting for the dye you have selected Check the 'hardware list' on the hardware screen	Contact info@thistlerscientific.co.uk to upgrade your system Programme in any extra lights or filters that you may have on the hardware screen
Dye not in list	Your dye is not in the database	Contact info@thistlescientific.co.uk
Dye name is greyed out	You do not have the appropriate hardware to image that particular dye Check the 'hardware list' on the hardware screen	Contact info@thistlescientific.co.uk to upgrade your system Programme in any extra lights or filters that you may have on the hardware screen
Transilluminator will not turn on	Make sure the transilluminator switch is in the 'on' position Make sure the darkroom cabinet is completely closed	If the transilluminator will not turn on, then please contact info@thistlescientific.co.uk Transilluminator will not turn on when the cabinet door is open for safety reasons The tubes may need replacing

Glossary

The following glossary defines words used in this manual.

Auto Capture- the software will configure the optimal exposure time for your sample using the maximum number of greyscales from your camera.

Histogram- A graphed representation of brightness, or grey value, of an image.

Image source- there are two types of image sources, original and processed. If you have made enhancements to your image such as sharpening, smoothing and cropping an area this will alter the image source and the image will now be processed.

Iris- On a CMOS camera the iris is an adjustable aperture used to control the amount of light coming through the lens.

Dynamic fielding- The dynamic field function corrects for uneven illumination of light sources.

Speckle correction- will remove white speckles or ‘hot pixels’ (bright spots) from the image.