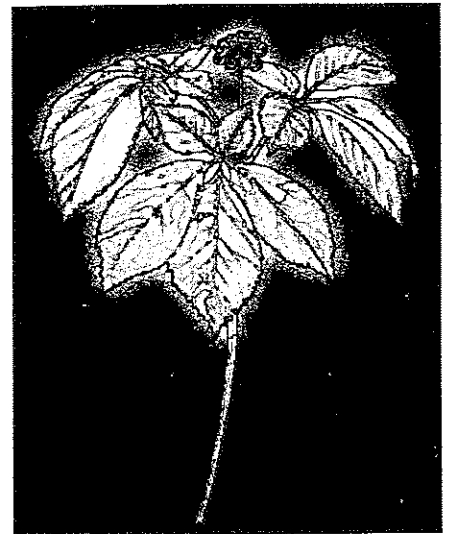


GIS/GPS Utilization in Ginseng Siting

The Area of Discussion

Many in Appalachia and other temperate regions of our country and Canada have come to experience wild ginseng and its value as a medicinal herb and a cash crop. These people desire to know whether their own wooded properties have suitable sites for finding or raising virtually wild ginseng. They realize that the wild ginseng root can bring as much as \$400 a pound (or even more for older and prized roots). The desire to grow ginseng may stem from the need to find alternatives for small tobacco patches, or to furnish personal and family needs; they may hear that the value of their land increases when a non-timber forest product such as ginseng grows on it, or realize that growing virtually wild ginseng is a practical and ecological alternative to cutting timber, thus saving forest land. Cultivated ginseng is harvested only once, a few years after planting, whereas virtually wild ginseng bears roots suitable for harvesting on a continual basis.

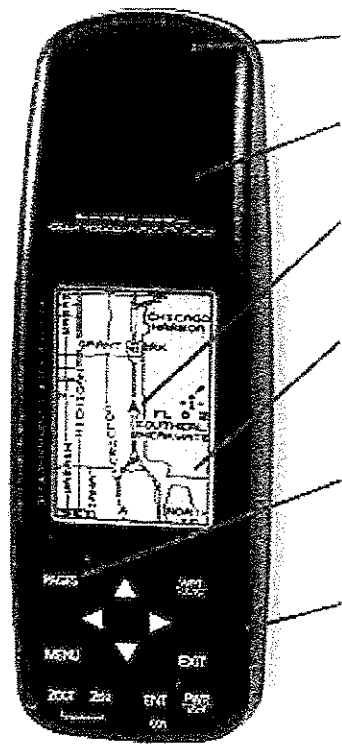


Current Hurdles

These potential ginseng growers are generally not naive. The ginseng seed is quite valuable, and growers do not want to waste it by sowing it in an area where it will not flourish. The ASPI Siting Service has been started to help the fledgling ginseng grower consider the combination of characteristics (land slope, sun direction, soil type, drainage, tree type and forest cover, etc.) that go into the planting decision. The Appalachian Ginseng Foundation (AGF), having acquired the computer hard- and software capability to offer this siting service, has found one major drawback: the hesitancy of growers to have their land analyzed and specific ginseng growing locations identified. However, with the institution of a protective marketing card system that would require verification of ginseng ownership, the quite valid fear of poaching will be reduced and the service will be reinstated. At a nominal fee, we are able to electronically survey a given farm or woodland and tell with a high level of accuracy whether virtually wild ginseng has grown, or can be grown, on the particular land.

Traditional Siting Methods

The siting procedure is not novel, only streamlined. Experienced "sangers," those versed in gathering wild ginseng, know the lay of the land and the approximate microclimate temperatures in hills and hollows, and



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Hand held GPS unit

so could predict with fair accuracy where ginseng would most likely be found. However, this process requires physically traversing the land itself. A second quite versatile method in pre-computer days required a person knowledgeable with maps to overlay topographic, soil and hydrologic maps, enabling them to predict with fair accuracy the growing patterns of wild ginseng in Appalachia and neighboring areas.

GIS/GPS

Modern instrumentation can be used to replace topographical, soil and other map overlays in an effort to determine whether certain land surfaces could grow virtually wild ginseng. In fact, the manual map overlay method is quite good, and can pinpoint areas where the grade is good, cooler and moist slopes are indicated, forest cover is designated, and where the soil type will support

ginseng growth. A more convenient method is to use the combination of a Global Positioning System (GPS) and a Geographic Information System (GIS), both fairly recent technological innovations receiving widespread use in other site selection operations.

Location

The GPS device is essentially a radio that helps you locate WHERE you are and/or how to go to a preselected place. The GPS was developed by the United States military services to track their forces on land, sea or air and has since been declassified; now anybody in the world can use this system. A GPS unit is a hand-held device that can be purchased from sporting goods and most electronics stores for less than a hundred dollars. The GPS radio is a receiver just like an AM or FM radio, except that it picks up timing signals from two dozen NAVSTAR GPS satellites that orbit twelve thousand miles above our planet. These satellites constantly transmit their position and the exact time in orbit. The GPS receivers accept information from three or more of the satellites and through triangulation of their signals can determine the speed and direction of movement, elevation, and the exact position of the receiver. A GPS unit can help locate ginseng growing in wooded areas and among native vegetation, on large, isolated or unfamiliar acreage. While this natural cover can be good for secrecy and protection, it may make ginseng hard to locate the following year. Using a GPS unit, a trail can be marked to which only the grower has access. Trail numbers can be placed within the memory of the GPS receiver, thereby marking it electronically. At a later time, one need only input these same marker numbers to locate the trail and exact patch. The GPS receiver can tell one the direction and distance to the next marker location. These coordinates need to be recorded in a safe place. Each marker has an accuracy of 30 feet, meaning one is within 30 feet of the exact location.

Mapping

The GIS is a computer mapping program which the Appalachian Ginseng Foundation (AGF) is currently implementing. GIS has already affected most of us in some way without us even realizing it. If you've ever used an Internet mapping program to find directions, congratulations, you've personally used GIS. The major advantage of GIS is that with a proper sized computer and appropriate software, the mapping is clean and easily handled. Once the basic information is gathered, one is able to draw a variety of useful maps. Data collected from different sources can help to pinpoint the best possible locations for ginseng patch placement. Data being used include topographic maps with proper elevations, soil and water flow data, and three dimensional modeling that simulates the rising and setting of the sun to help determine sunny and shady spots on potential ginseng growing areas. Some states have made this data available for free, whereas others, either have not developed data, or require a modest to sizeable payment for data use in its current format. With a combination of GPS/GIS, a grower is able to obtain an excellent map for the siting of virtually wild ginseng.

Ideal sites

Wild ginseng grows in a variety of cooler areas of North America. Some ideal site attributes include: a cool north or northeast to east slope; well drained sloping land; granular soils with sufficient calcium content; and dappled shade or tree cover from temperate hardwood trees which are not too dense.

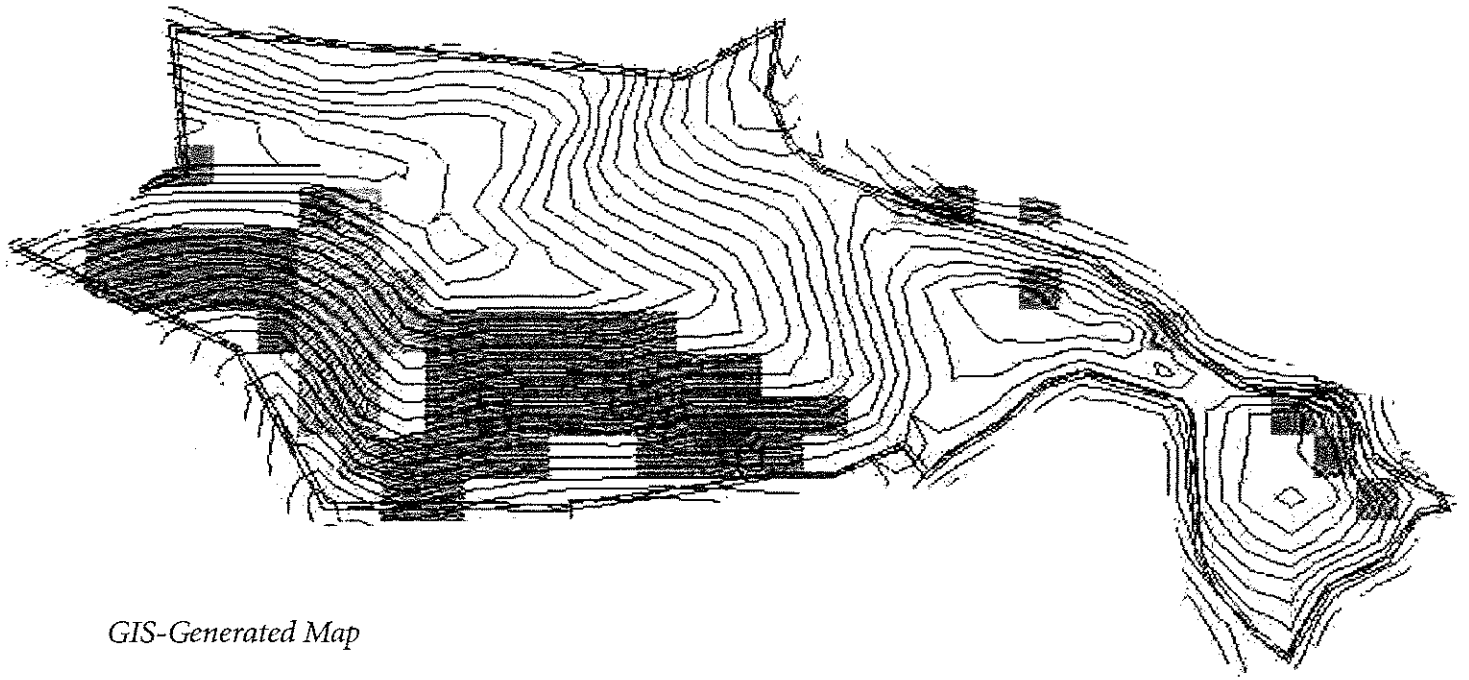
Saving a position fix

Some people can memorize positions found on the GPS and return to them with great fidelity, while others of us require more help or preparation. It may be necessary to locate the position and mark it in a secured notebook, or with a special code which others could not easily access. Certain "landmarks" could be recorded either by shorthand notation or by commonly used local names. Most of the current GPS units allow you to enter this code name (of up to four letters), or accept the receiver-generated name for the particular landmark. Another, and less difficult approach, is to mark the site at given points on the journey through the ginseng producing or seeded area. Remember, this is the way the marking person or others can precisely return to within a few feet of the desired ginseng location.

Some ways of utilizing the GPS/GIS system that ASPI is currently using, or considering for future projects, are:

- ± marking water pollution testing spots of our local watershed
- ± plotting water flooding and the damage it has caused in Appalachia due to deforestation
- ± tracking the damage and amount of mountain top removal

GeoCaching is an example of one of the fun things to do with your GPS unit. It was launched May 3, 2000 as a way of celebrating the lifting of Selective Availability, making the GPS accurate to within 30 feet (the timing error originally used by the military as a safety precaution made the GPS accurate only to within 150 feet). The game of Geocaching, played worldwide, allows one to be a treasure hunter. Using the online search engines (i.e. <www.google.com>) to search for "geocaching," or going to <www.geocaching.com>, you will find GPS coordinates and instructions on discovering treasures that people have placed in hidden locations.



GIS-Generated Map

Locations of Virtually Wild Ginseng Patches using ASPI's GIS

The above map was created using GIS software by applying layers of data sets. Using a Digital Elevation Map (D.E.M.), contour lines were generated, and the direction of the Sun angle and height was set to Noon on the spring/fall equinoxes. The slope was averaged between 25% and 40%. Then, slope face direction was calculated and the North and Northeast directions were filtered out, since they are the directions we are looking for. Then using GPS coordinates the property line was established and added to the map. Locations meeting our criteria are marked on the map as square colored areas, the darker squares showing north-facing slopes, which are considered the prime locations for virtually wild ginseng patches. Lighter colored areas are north-east facing land and are considered the secondary patch locations. After examining the particular test property shown on the above map, we found wild ginseng in the exact locations indicated. To us, this was a profound example of the accuracy, power, and usefulness of G.I.S. system.

Using ASPI's GIS Service

The ginseng grower can go to the ASPI website <www.a-spi.org> to learn more about virtually wild ginseng and how to make use of our GIS/GPS Service.