Hyperstealth Biotechnology Corp. Summary by President/CEO Guy Cramer: August 28, 2018

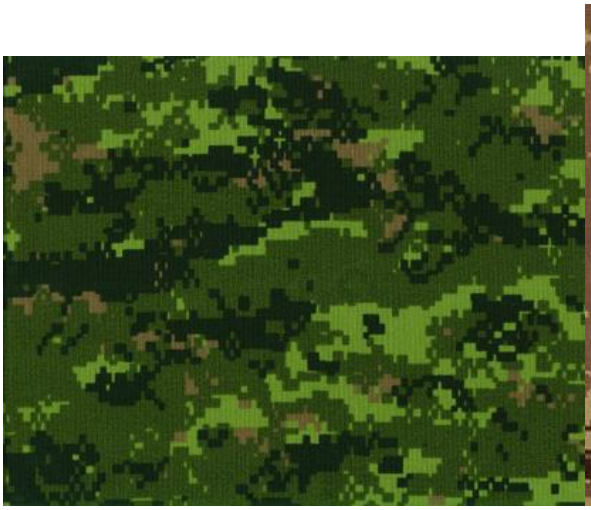
Canadian Forces considering changing regular forces camouflage from CADPAT Temperate Woodland and CADPAT Arid Regions to Multicam

I have previously published most of this material online in a six-part series back in 2013, this is a condensed form with the focus on CADPAT (Canadian Disruptive Pattern) owned and developed by the Canadian Military and Multicam, a patterned developed and owned by Crye Precision in Brooklyn, New York. As the Canadian Military contemplates going to one camouflage pattern my goal is to show that the two CADPAT patterns are still very effective and that U.S. Army scientist have concluded from numerous camouflage tests that the one pattern idea for all environments is not the most effective solution.

Hyperstealth Biotechnology Corp. is a Canadian Corporation. I, Guy Cramer, as the President / CEO have developed camouflage for numerous countries around the world, over 5 million military issued uniforms use Hyperstealth patterns and I have developed over 14,000 camouflage patterns to date.

As I write this I must consider the lives of the soldiers that this decision will affect. As a leader in this field it is my responsibility to point out facts, failures, politics and scientific conclusions that the Canadian Military leadership may be unaware of.

Canada wore Olive Drab fatigues up until the late 1990's when their military research showed that there is a 45 percent less chance of being detected from 50-300 meters away with their new CADPAT. They also found that the enemy had to be 35% closer to a soldier wearing CADPAT to detect him/her over the soldier wearing a Monotone (Olive Drab) Uniform. CADPAT TW (Temperate Woodland) Below Left, CADPAT AR (Arid Regions) below right.



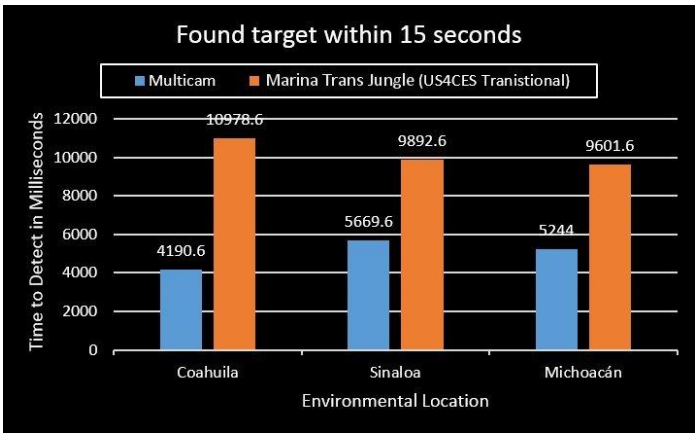
Both patterns were developed by the Canadian Military and are highly restricted to only the Canadian Military. The Canadian Military does not pay a royalty to use either of these patterns as they own them.

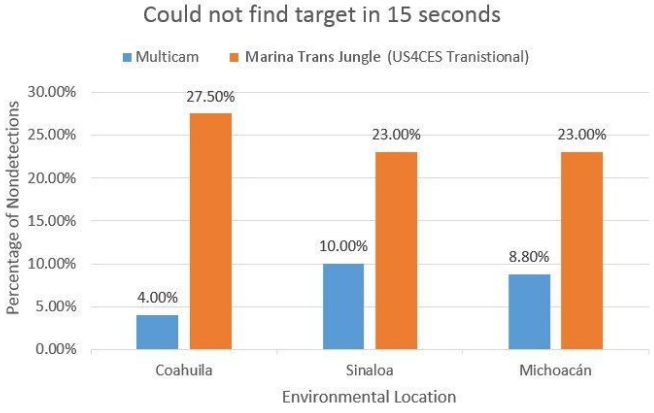
As happens in many militaries, the Special Forces of a country will begin using a different pattern to their regular forces. Most Special Forces do not have the same restrictions as regular Forces on what they select and many times it is not based on testing but on factors that would not normally be permissible under their rules for their regular forces. The regular forces at a later date then adopt the pattern the Special Forces are using since their military is already using it. We call this the trickle-down effect. Canadian Special Forces recently switched to Multicam and the Chief of the Defence Staff is considering switching the Canadian regular forces to the same pattern and abandoning their current two CADPAT patterns.

I will also review in this summary why our Canadian Special Forces situation is different than our Regular Forces.

In 2010 I, (Guy Cramer) and ADS Inc. of Virginia Beach, Virginia, developed the US4CES (pronounced US Forces) camouflage family for the U.S. Army Phase IV Camouflage Improvement effort, in 2011 the US4CES patterns were selected as a finalist having to exceed the baseline U.S. leading camouflage patterns in their respective environments which were the U.S. Navy AOR2 (Woodland), U.S. Navy AOR1 (Desert) and Multicam (Transitional environments in between Desert and Woodland). AOR2 beat the USMC Woodland MARPAT and the AOR1 beat the USMC Desert MARPAT in those environments according to U.S. Army testing in 2009.

After the cancellation of the U.S. Army Phase IV program in 2013, the Mexican Marines acquired the rights to our US4CES Transitional pattern, objectively tested it against their digital pattern that was in use at that time, and after demonstrating it was nearly twice as effective. They then objectively tested against Multicam in three different Mexican environments and concluded it was nearly twice as effective as Multicam in each one of the environments and now field the pattern across Mexico. The Marines renamed the pattern “Marina Trans Jungle”. Below are the objective test results between Multicam and Marina Trans Jungle (US4CES Transitional). The chart on the left is the time it took to detect the target in milliseconds in the three environments (in Coahuila it took an average of 4.19 seconds to detect Multicam but 10.97 seconds to detect Marina Trans Jungle). The Chart on the right is the percentage could not find the target within 15 seconds in the same three environments. In the Coahuila environment on average the observers could not find Multicam 4% of the time and they could not find Marina Trans Jungle 27.5% of the time within the 15 second time limit.





Note the US4CES patterns are no longer available to license or acquire.

U.S. Army Camouflage Study 2007-2008

The U.S. Army Natick Labs tested 18 patterns from 2007-2008 confirmed that all in one patterns like Multicam and UCP do not work well in either Woodland or Desert settings. Multicam scored 6th out of 13 in Desert, Urban (4th place) and Woodland (6th place). The two MARPAT patterns tested extremely well: with Desert MARPAT scoring 3rd place out of 13 patterns in Desert, Urban 1st place and the Woodland MARPAT scored 2nd place in Woodland.

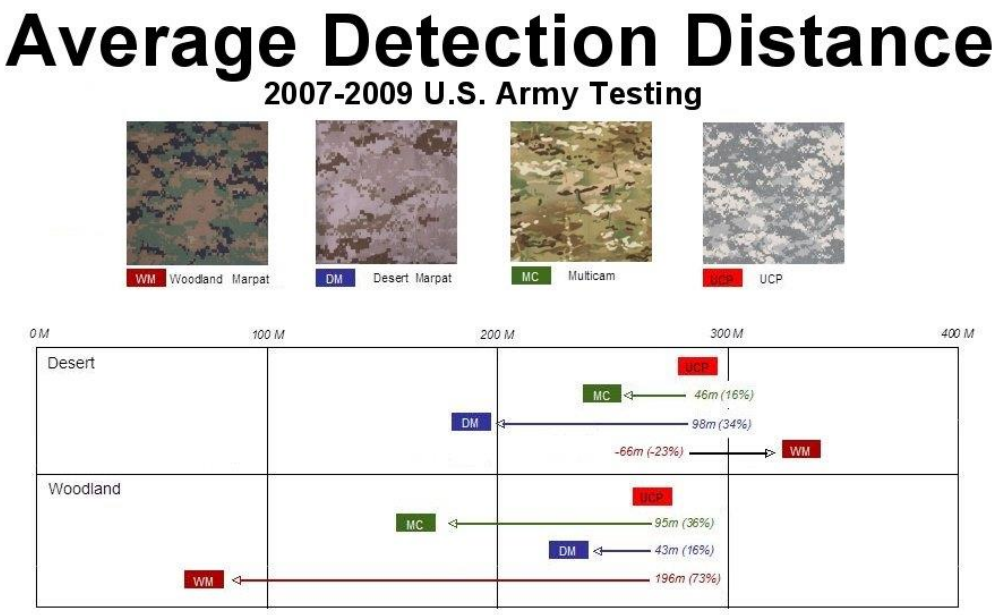
Ranking of Patterns by Environment

Table 8

	Desert	Urban	Woodland
Best	Desert British	Desert MARPAT	China
	Syria	Desert Brush	Woodland MARPAT
	Desert MARPAT	Desert British	Mossy Oak
	Desert Brush	MultiCam®	French
	Bulldog	Syria	Iraq
	MultiCam®	Natural Gear	MultiCam®
	Natural Gear	Iraq	Syria
	Mossy Oak	UCP	Bulldog
	UCP	Bulldog	Natural Gear
	French	China	Desert Brush
	Woodland MARPAT	Mossy Oak	Desert MARPAT
Worst	China	Woodland MARPAT	UCP
	Iraq	French	Desert British

Below is a chart that shows how close each of the U.S. Military issued patterns could get to the observer without being spotted with the baseline being the distance at which UCP (U.S. Army's Universal Camouflage Pattern) could be detected**. In a Woodland setting Woodland MARPAT could get 101 meters closer to the observer than Multicam could and in a Desert environment Desert MARPAT could get 52 Meters closer than Multicam**.

In a woodland setting a soldier wearing Woodland MARPAT could get the entire length of a football field closer (Canadian Football Field) to the observer before being detected over Multicam!

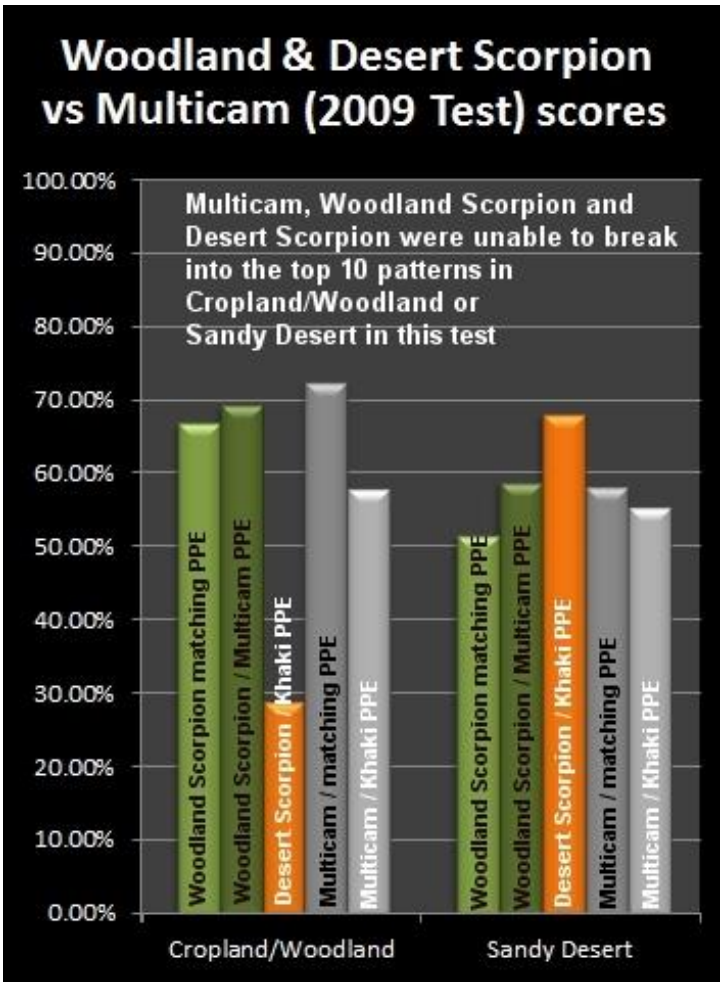


U.S. Army Natick Labs conclusion from this study: "The data clearly show that environment-specific patterns provide the best camouflage, i.e., the lowest probability of detection, in their respective environments"

In 2009 the U.S. Army Natick Labs tested U.S. patterns, this time including the newly issued U.S. Navy's AOR1 and AOR2 and found that **Multicam did not finish in the top 10 in either woodland or sandy desert environments**. It did preform well in Rocky deserts and Mountainous, these were common in Afghanistan and helped the U.S. Army decide in 2010 on Multicam to replace UCP but only in Afghanistan.

Image below left, U.S. Army testing results in Cropland/Woodland and Sandy Deserts of Multicam and Woodland Scorpion, an early version of Multicam developed around 2002 by Crye Precision the same company that developed and owns Multicam. The U.S. Army has been issued Scorpion W2 and the U.S. Air Force has just decided to follow the Army with the same pattern.

Image below right, UCP, Multicam and Sniper in Ghillie Suit at bottom.



Digital Pixel Patterns are Effective

What we also see from the 2009 Natick study is that pixelated patterns still dominate the top place finishers in all environments. Pixel's within camouflage are not a fad but a proven and effective form of camouflage. The failure of UCP was not due to the pixelated pattern but the colors chosen for the pattern. CADPAT/MARPAT/AOR1, AOR2 all come from the same print screens used for UCP. (Note the Natick study did not include CADPAT TW or CADPAT AR).

In Rocky Desert terrain

1st Place Multicam
2nd Place USMC Woodland MARPAT Digital (pixelated)
3rd Place Woodland Digital (pixelated)

In Mountainous Terrain testing

1st Place Tie Multicam and U.S. Navy AOR-Universal (pixelated) both tested equal
2nd Place Woodland Scorpion
3rd Place U.S. Navy AOR-2 (pixelated)

In Cropland/Woodland tests

1st Place Woodland Digital (pixelated)
2nd Place U.S. Navy AOR-2 (pixelated)
3rd Place USMC Woodland MARPAT Digital (pixelated)

In Sandy Desert Terrain tests

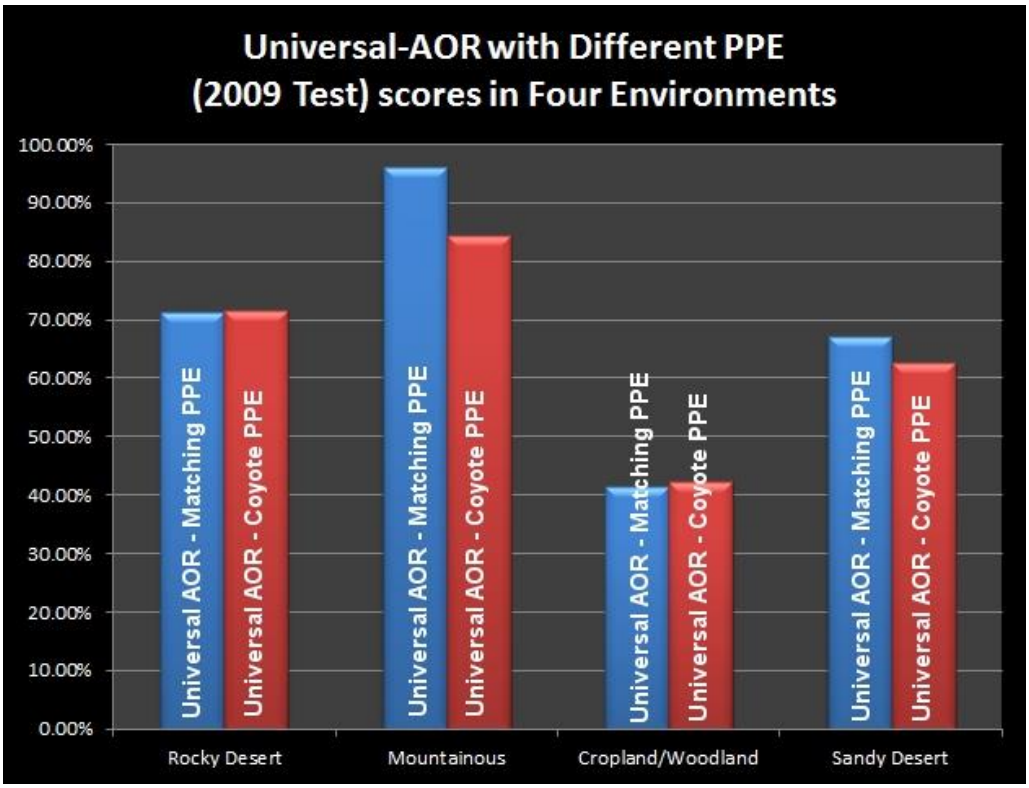
1st Place DCU Digital (pixelated)
2nd Place U.S. Navy AOR-1 (pixelated)
3rd Place Desert Brush
4th Place USMC Desert MARPAT (pixelated)

Images below shows the differences between Woodland MARPAT and AOR2 and Desert MARPAT and AOR1. They use the same screens as CADPAT TW which was developed by the Canadian Military in the late 1990's and authorized by the Canadian Forces to the USMC in 2001 with the stiulation that the colors had to be different than CADPAT TW and CADPAT AR

Universal AOR

The U.S. Navy in developing AOR1 and AOR2 for their ground teams – specificly their Navy SEAL teams, also developed Universal AOR (shown below) for environments inbetween AOR1 (Desert) and AOR2 (Woodland). It used the same screens as AOR1 and AOR2 but was colored differently.

It tied Multicam for 1st in Mountainous environments but it did not do well in Rockey Desert, it was ineffective in Cropland/Woodland and only slighlty effective in Sandy Deserts. PPE below stands for Personal Protective Equipment as the testing would simulate a vest with the matching pattern or a solid "Coyote" color). Once again the "Universal" concept was proven ineffective across mulitple environments. The Navy never issued Unirversal AOR.

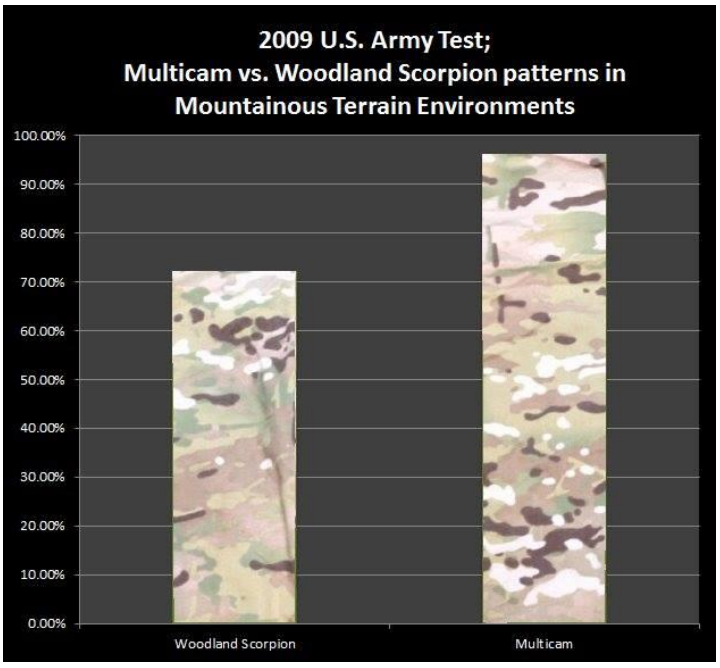


U.S. Army Phase IV Camouflage Improvement Program Cancelled

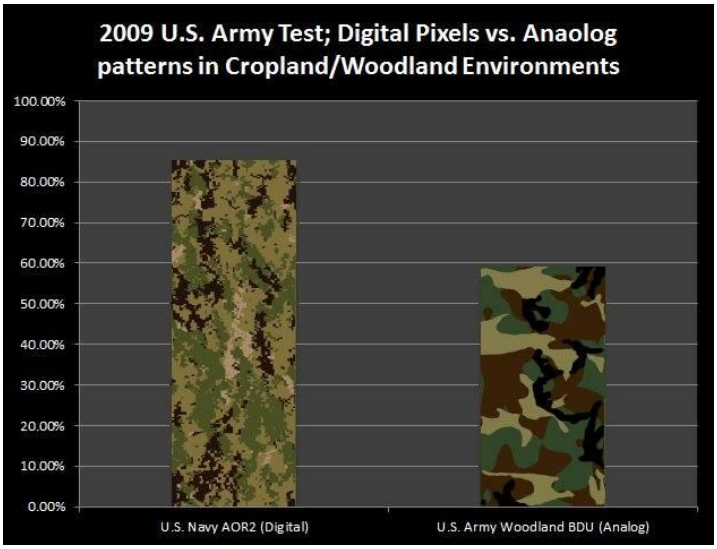
The Phase IV trials and testing concluded in 2013 and two weeks before the winner was to be announced the program was cancelled. Just prior to the cancelation the U.S. Congress passed a new law limiting the U.S. Military to only current camouflage patterns in use. Multicam, due to the 2010 U.S. Army issuance of Multicam for Afghanistan allowed the Army to select it as a branch wide replacement, negotiations between Crye Precision (owners of Multicam) and the U.S. Military broke down and the Army decided on issuing Scorpion W2 which had been developed by Crye Precision for a U.S. Army camouflage study in 2002-2004 and was a precursor to Multicam. The Army believed they owned the Scorpion W2 pattern but Crye had patented it immediately after the trials and the Army continues to pay royalties to Crye for the Scorpion W2 pattern while the courts contemplate the ownership.

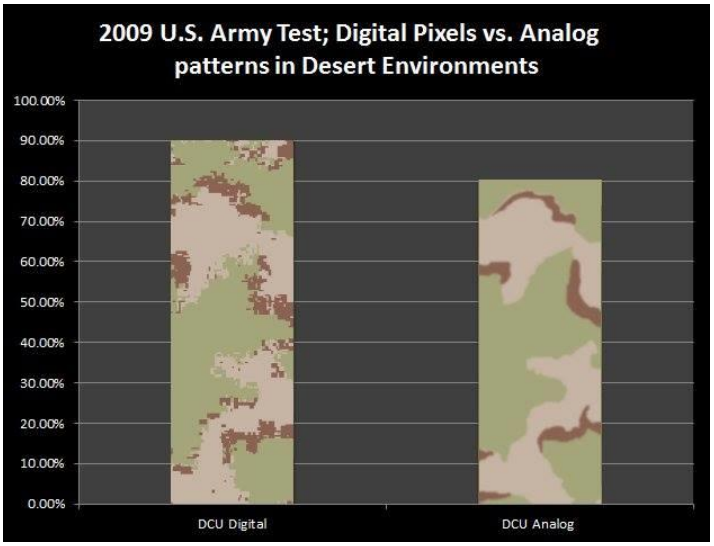
Ironically the Scorpion pattern in a 2002-2004 Natick study placed 3rd out of the 4 finalists. “All Over Desert Brush” won the competition which was developed by the U.S. Army Natick Labs and is owned by the U.S. Military and would not require royalties.

Most people have difficultly seeing the differences (visually) between Scorpion W2 and Multicam but testing by the U.S. Army shows that Scorpion does not preform as well as Multicam.



Digital Pixels versus Analog in Woodland below left and Desert below Right

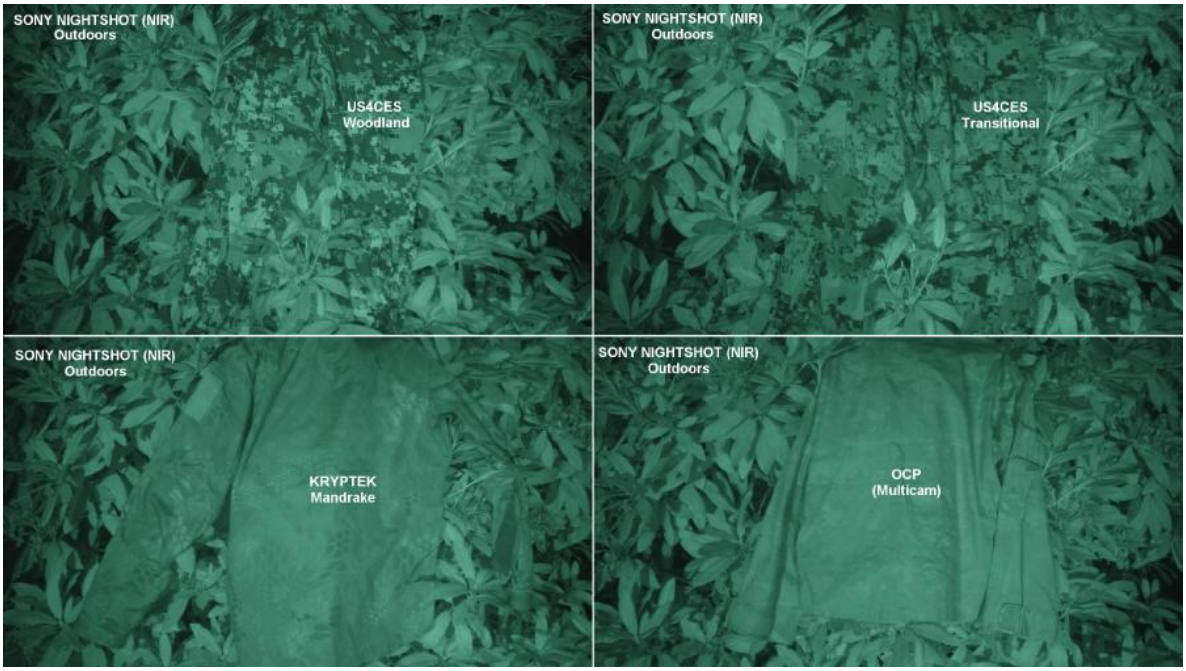




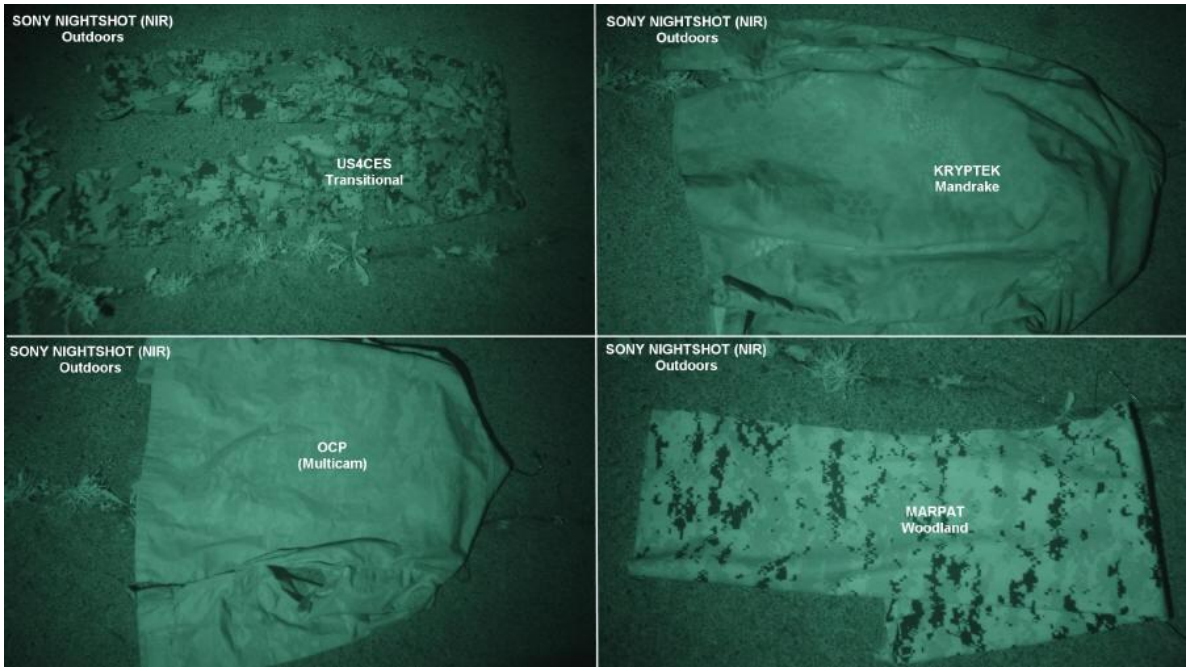
Night Operations

One critical component of camouflage often overlooked is how it looks through Night Vision Equipment as first world militaries have a huge technological advantage at night time allowing them to see the enemy without being seen by the enemy. That concept is changing as Night Vision devices are getting cheaper, readily available and more effective. My images below with a commercial video camera caused the U.S. Military to rethink who may be seeing them at night. This means what you are wearing and how it shows up at night through those night vision devices and may determine if your camouflage is providing a benefit or a disadvantage.

The issue of colors not having enough contrast to disrupt the target is referred to as isoluminance, in the image below you can see that both our US4CES patterns blend in extremely well, whereas the Kyptek Mandrake (colored for Woodland environments and also a finalist in the Phase IV competition) and Multicam suffer from this lack of contrast.



On concreate, typical of many urban settings this isoluminance effect also causes problems if the main color reflecting back is too bright or too dark.



The U.S. Army's Military Academy in 2009 published a study where they identified UCP, Multicam and Woodland MARPAT as being too bright for night vision devices in woodland operations and identified a COTS (Commercial Off The Shelf) hairspray that could be used to darken the three camouflages enough in the NIR (Near Infrared) spectrum. This temporary solution also changed the visual coloration darkening each of the patterns as can be seen below with the spray applied to the lower half of each camouflage. This study identified a key issue with these patterns under night vision in woodland environments.

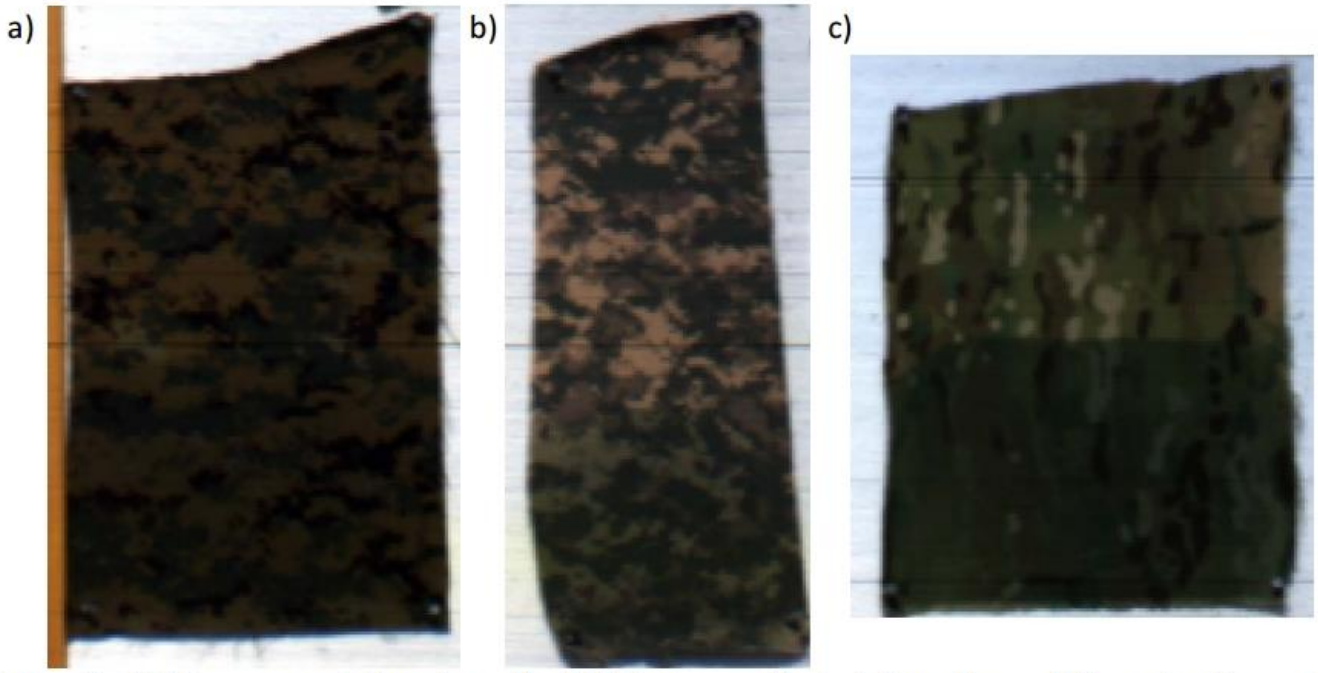
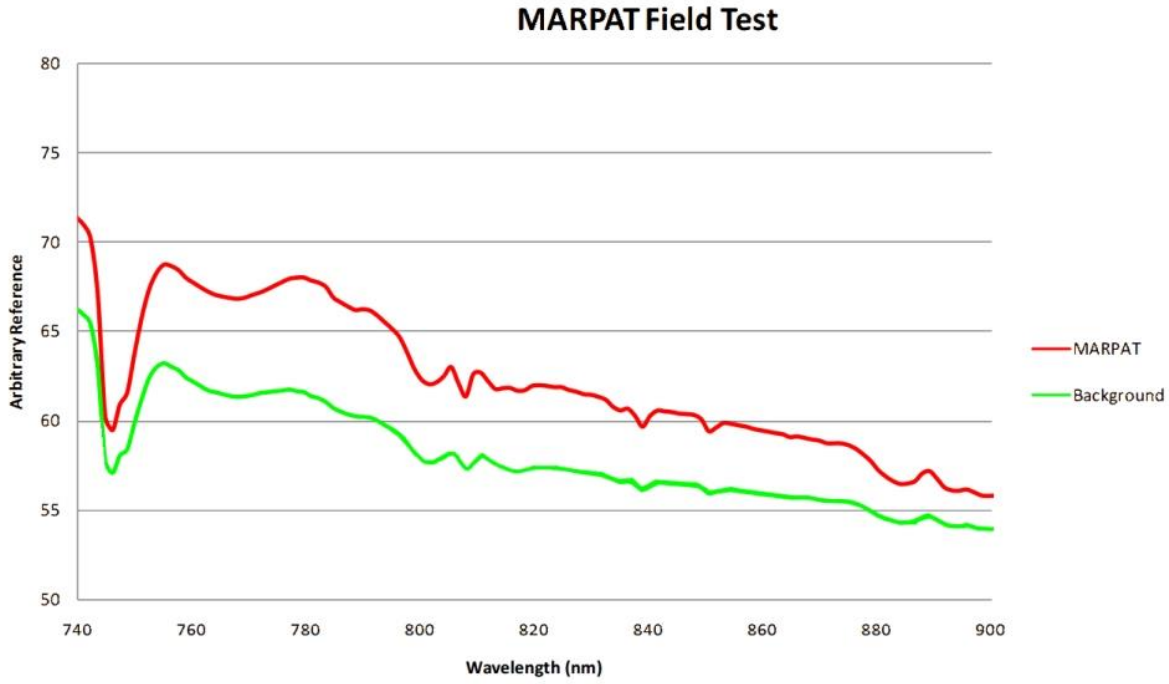
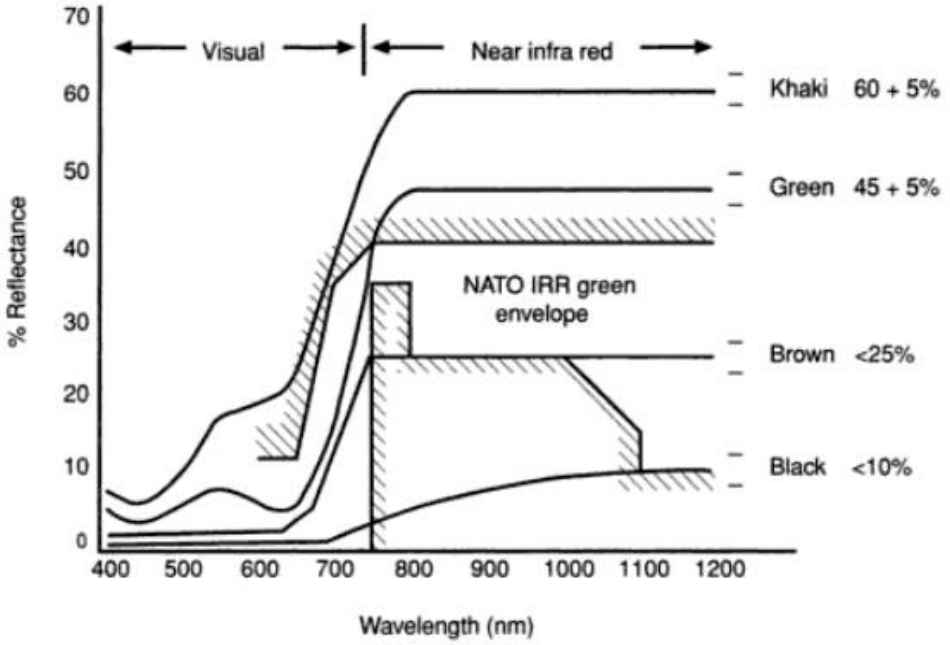


Figure 7. RGB representation from the HSI image collected from three different patterns a) MARPAT, b)UCP, and c) Multicam.

The U.S. Army testing results below identifying Woodland MARPAT's overall brightness in the NIR compared to the woodland background. This chart shows the difference before the COTS treatment.

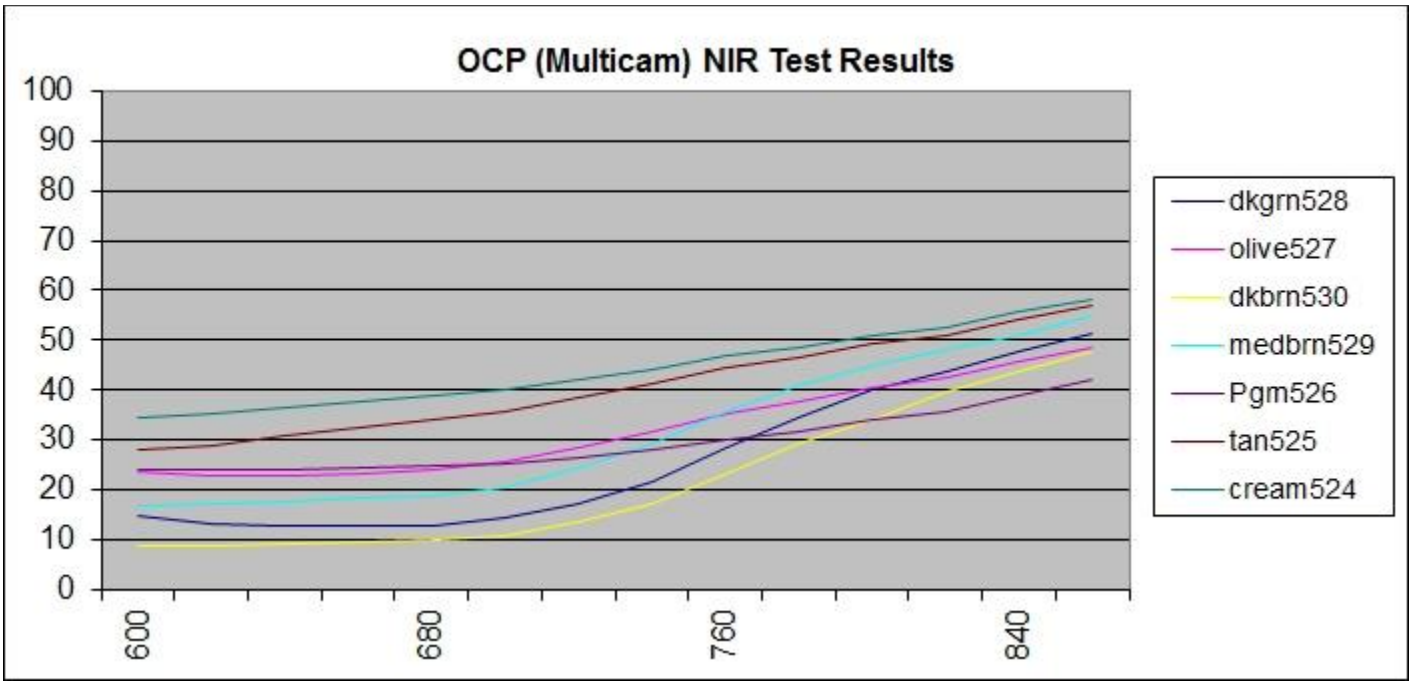


NATO had determined what those levels should be in woodland settings in the chart below. Note that typical military night vision operates around 900 nanometers (nm), the full moon or artificial lighting can vary this into the 750 nm range. High Level Special Operations have access to very expensive devices which operate further into the NIR – which doesn't even show up on this chart below. You want the contrast between the colors to match how different elements reflect within this spectrum, so you can both blend and disrupt the soldier.

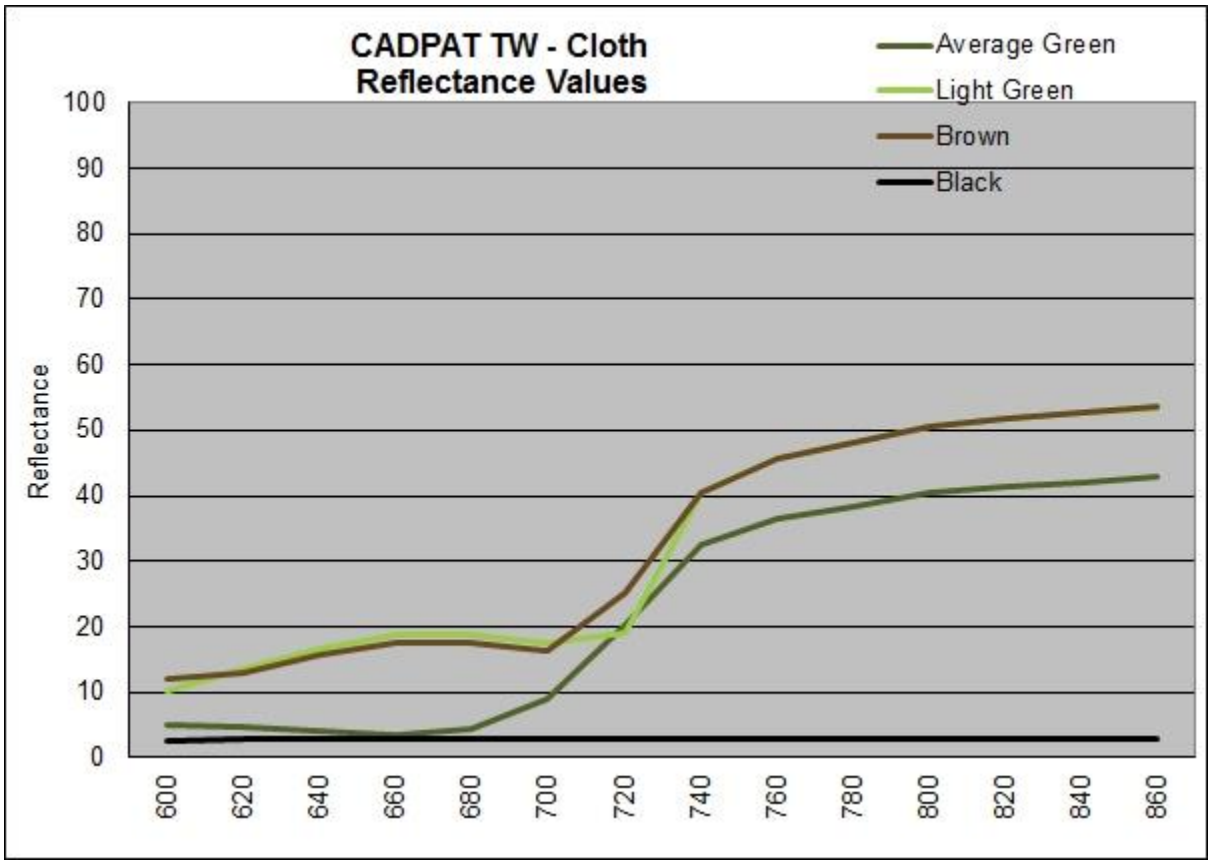


16.11 Reflectance curves for four-colour disruptively patterned textiles.

Multicam shown on the next chart from reflectance lab testing confirms what we saw in the images prior, not enough contrast farther into the NEAR Infrared spectrum and it does not meet the suggested NATO NIR seperations. It gets worse the farther into the NIR you go, beyond the spectrum shown in the chart.



CADPAT TW (Temperate Woodland) below meets most of the NATO suggested requirement and due to the percentage of brown at around 5% of the overall pattern, the color not matching the NATO suggestion is not critical to the overall pattern reflection.



A Canadian Military handbook looks at this further:

197. NIR. All modern militaries, and many other groups involved in armed conflict, are equipped with II devices (a.k.a., Night Vision Devices) that magnify the available light in the NIR portion of the spectrum (approximate wavelengths of 750 to 1,200 NM). This portion of the spectrum is invisible to the unaided eye, but with the aid of a night vision device is highly useful in detecting objects in low light conditions.

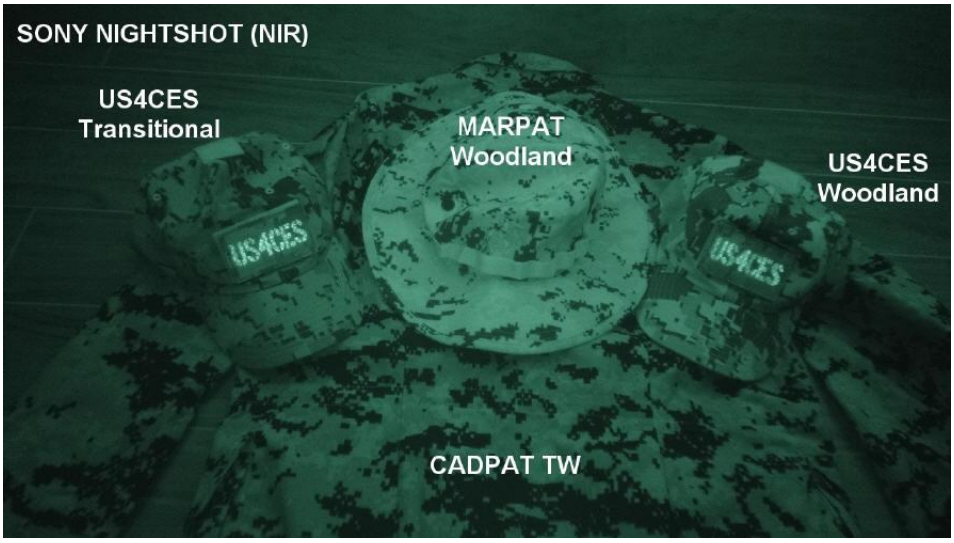
198. Objects viewed through night vision devices appear as monochrome images. The brighter the object appears, the greater its NIR reflectivity. Thus it is important that the NIR reflectivity of any object that you seek to camouflage must be as close as possible to the NIR reflectivity of its background. It is important to note when observing objects in the NIR part of the spectrum that the brightness of an object in the visual part of the spectrum does not necessarily mean that it will have a similar brightness in the NIR part of the spectrum.

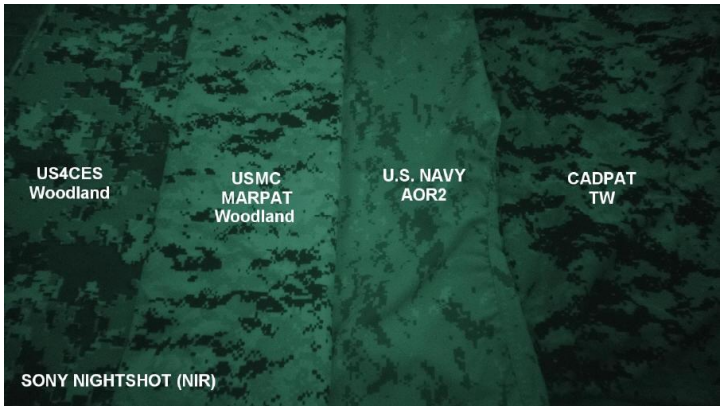
199. The Canadian Land Force Canadian Disruptive Pattern (CADPAT) was designed with these processes in mind. ***Although heavily criticized in the Afghanistan deployment (they are referring to CADPAT TW), it remained very efficient against night vision equipment.***

Another interesting quote in a 2009 CBC article regarding the CADPAT TW day time functionality in Afghanistan

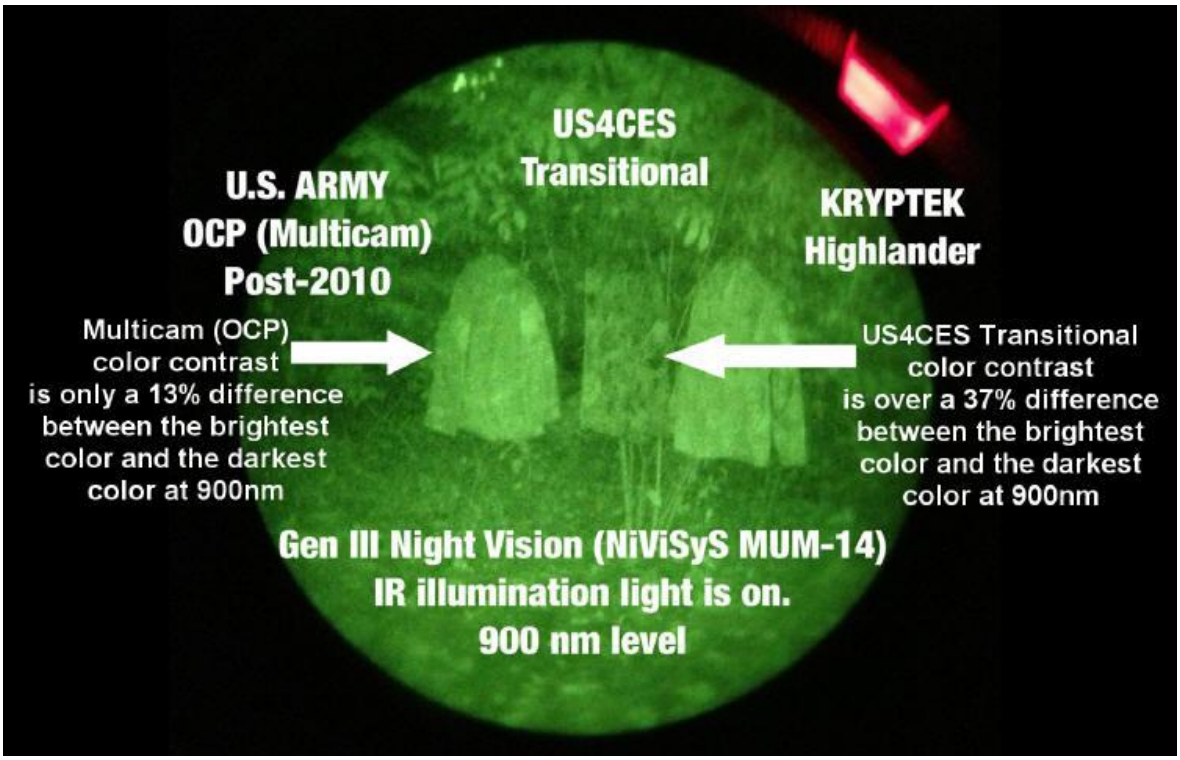
The military outfitted soldiers with separate sets of green and desert-brown uniforms after the first troops deployed to Kandahar in 2002 found that, **counter to the critics' assertions, green worked best in many of Afghanistan's operational environments.** **https://www.cbc.ca/news/canada/military-examines-camouflage-redesign-1.835282**

The image below shows the differences in Woodland MARPAT and CADPAT TW in the NIR spectrum which coincides with what we see in the charts previous.





The image below is from a military specified night vision device comparing Multicam with US4CES Transitional and Kryptek Hyighlander in a woodland environment with military grade night vision.



Desert (Arid Regions)

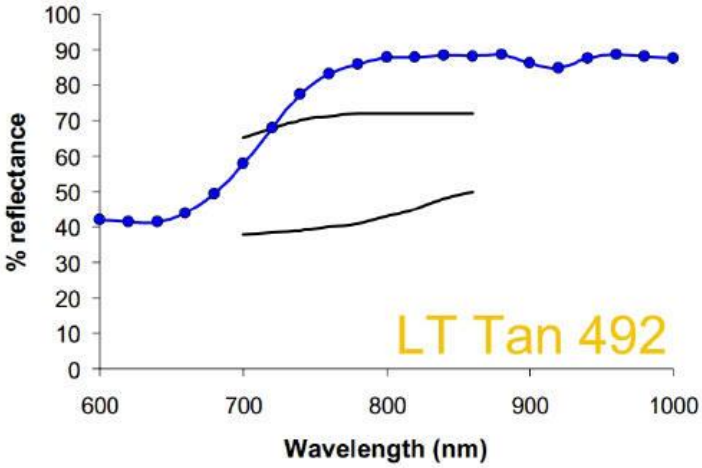
Deserts are much different than Woodland and in the late 1990's the Canadian Military attempted to recolor the same screens used for temperate woodland but identified that the desert pattern required larger macroelements (larger blobs) to match the background. Canadian Digital Desert Trial Uniform shown below left, Final CADPAT AR (Arid Regions) below center. Note that the USMC Desert MARPAT below right bears a striking resemblance to the Canadian Trial Uniform on the left because the USMC was granted permission from the Canadian Forces to use the pattern in 2001 and because Canada had already developed CADPAT AR, the USMC could use the initial trial pattern as a starting point and with some slight color modifications Desert MARPAT came about. CADPAT TW and AR have done very well in their respective environments in numerous NATO tests. CADPAT TW has also tested well for tropical and subtropical environments.

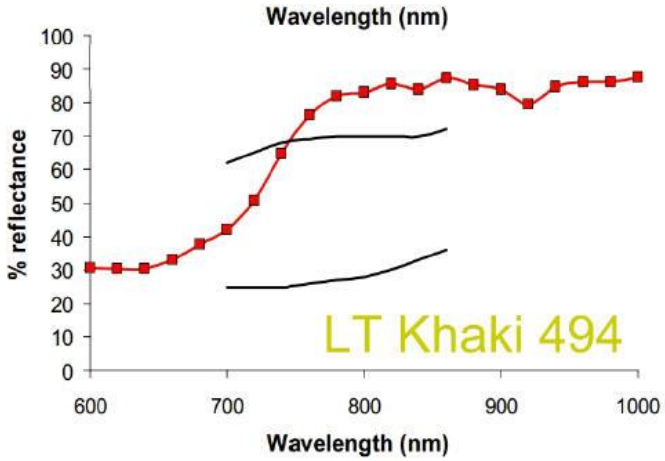
		
CADPAT Trial Desert camouflage late 1990's	CADPAT AR (Arid Regions) late 1990's Canada delayed the large scale production until 2002 as they had not anticipated troop deployment to Afghanistan, thus the first Canadian Forces in Afghanistan in 2001-2002 wore CADPAT TW.	USMC Desert MARPAT issued in 2001 Both the Woodland and Desert MARPAT uses same print screens as the CADPAT Trial Desert pattern and CADPAT TW with permission of the Canadian Government

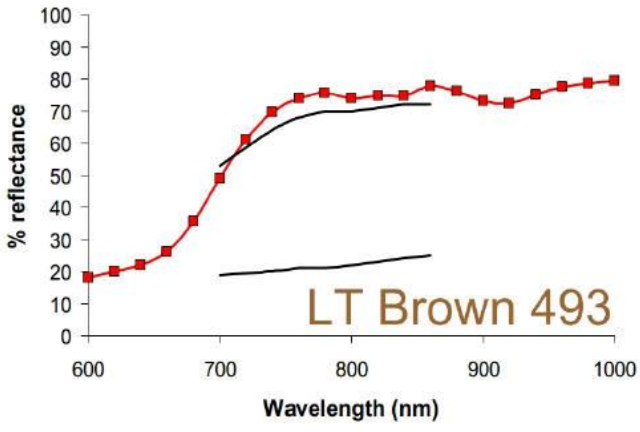
The limitation from the U.S. Army for the Phase IV program was for the family of patterns to match each other. To utilize what the Canadian Military had identified from their testing, I made two of the colors in the US4CES Arid (shown right) very close in shade which caused the pattern to appear more open in the visual spectrum but also utilizing color differences which helped in the NIR.

To the right is the U.S. Three Color Desert camouflage pattern or DCU (Desert Combat Uniform) which tests quite well in the visual spectrum so why is it no longer widely used? It's too bright in the NIR! Ironically this is the same problem that occurred with the four color woodland BDU pattern the U.S. Army used until 2004, it was strikingly bright in the NIR. There are still groups within the U.S. Military that use the DCU and other groups still use the Woodland BDU.

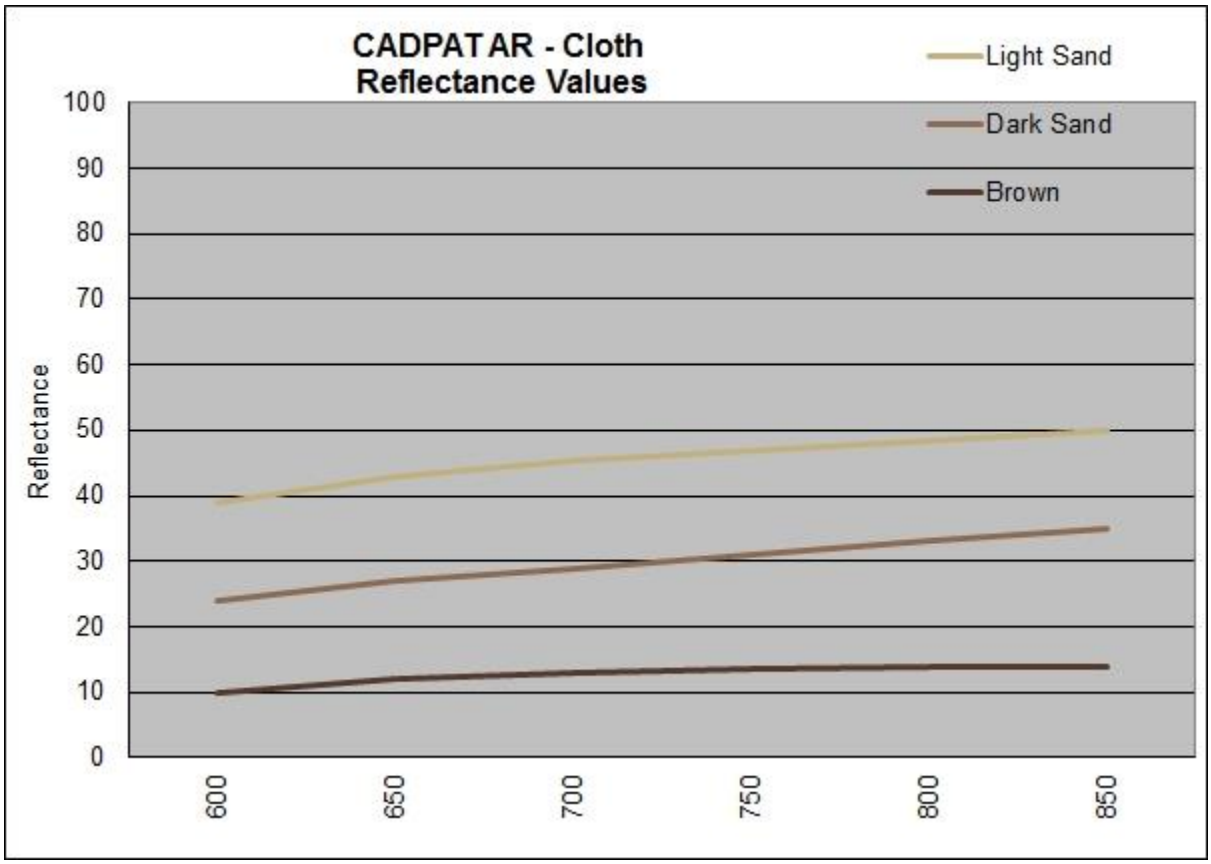
Below are the reflectance levels of the three colors used in the DCU and the black lines represent the optimum reflectance levels in-between those black lines as determined by the U.S. Military. As you can see they are all too bright and will give away the soldier's position in many cases to an adversary with a night vision device.



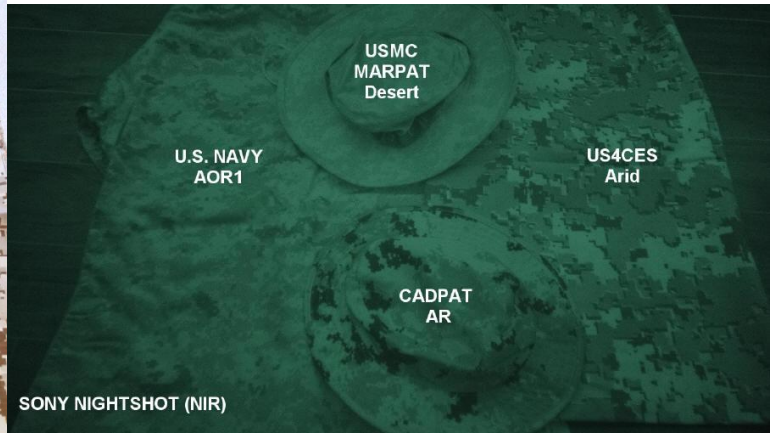


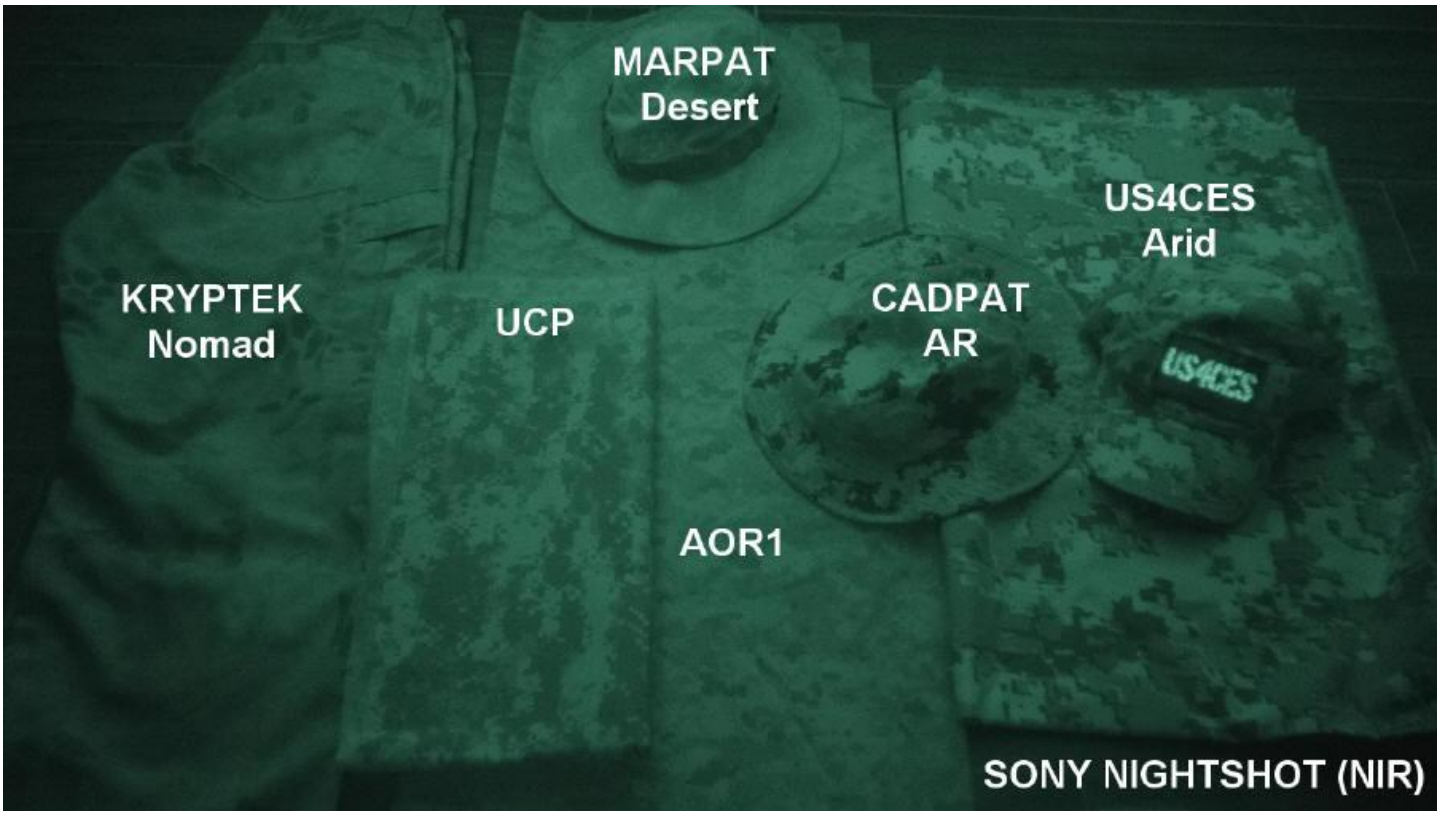


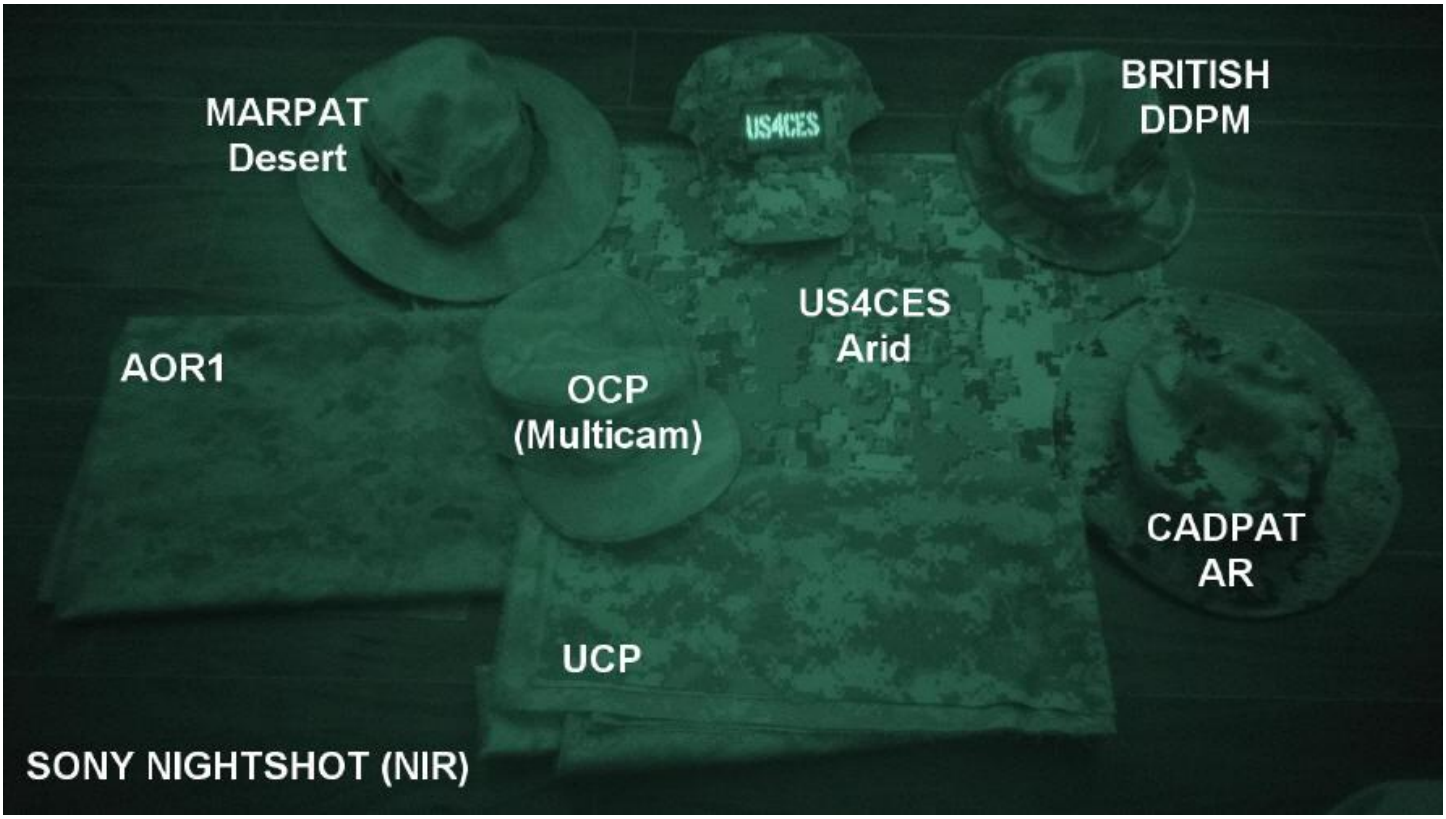
CADPAT AR (Arid Regions) was designed by the Canadian Military to not only provide the optimal effectiveness in most desert environments in the day, it was also engineered to function extremely well at night for NIR reflectance against Night Vision Optics.



As you can see below there doesn't appear to be a big difference in colors between the patterns in the visual spectrum, but even slight differences have a huge impact on the NIR as can be seen on the right. Knowing the Canadian Military had researched desert NIR levels for CADPAT AR, I used their levels and combined that with the U.S. Army R&D on the suggested desert NIR levels. I developed US4CES Arid combining the CADPAT AR and U.S. Army desert research reflectance levels, improving over the U.S. Military patterns.







The reason behind these major differences in the NIR between these patterns is that it was more of an afterthought due to the restrictions and expense of military night vision to be used by potential adversarial countries, which is no longer the case. The Canadian Military recognized that this technology gap would only last so long and focused on the NIR as part of a complete 24 hour per day solution when developing CADAPT in the late 1990's, whereas other patterns were developed for the visual spectrum as the priority and the NIR specifications were not based on researched requirements but on whatever the reflectance levels were regardless of overall NIR effectiveness.

What about our Canadian Special Forces using Multicam right now?

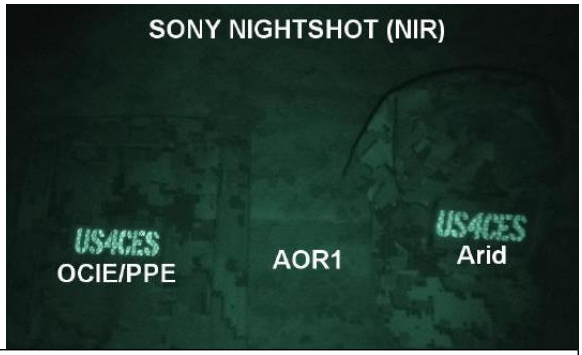
I am not opposed to Multicam for the Canadian Forces Special Operations (CANSOFCOM). Their missions are often connected with allied SF teams, many of which wear Multicam or derivatives. Early in the Afghanistan conflict the Canadian SF were operating covertly in the country and the media released a photo of some of the first Taliban prisoners to be captured by allied forces. The CADPAT uniforms identified that it was the Canadian Special Forces and almost cost the Minister of Defence his position as he was claiming at the time that there were no Canadian personnel in Afghanistan at that time.

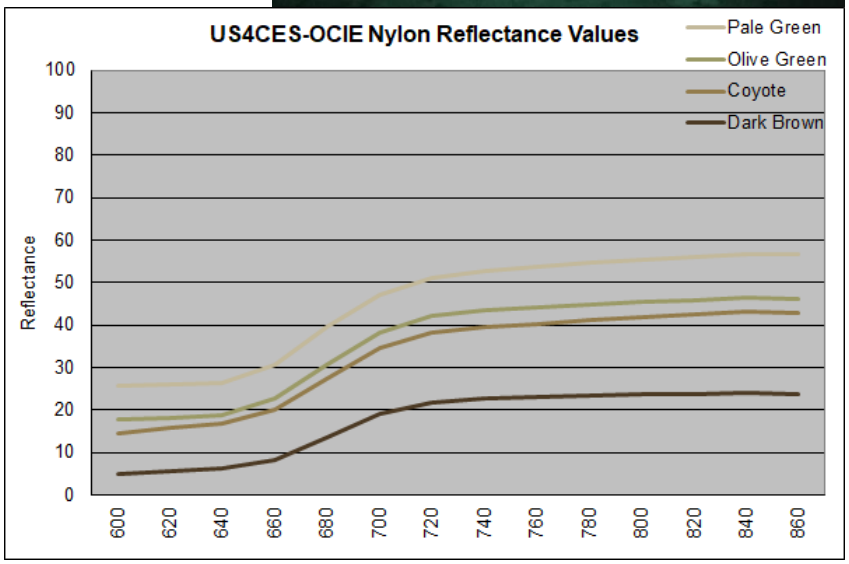
While digital patterns have proven to be very effective at normal engagement distances for regular forces, the special forces soldier can often be within a few feet of the enemy and digital patterns can looks artificial that close and could provide an anomaly to draw the attention of the enemy. The regular forces soldier should not be that close to the enemy under normal combat conditions. Many of the hot spots that our SF soldiers may be deployed to currently are in these environments that Multicam does function in.

The Canadian SF is not large in comparison to many countries and fielding a new camouflage for such a small group comes at a large cost, going with something that is already in production and is utilized by other SF teams makes sense from a budget point and from a logistics point as all the heavy nylon bags, pouches, packs… which are very expensive to produce in short runs are already being produced for others.

The U.S. Army Phase IV program allowed us one extra pattern over the three. This would be used for vests, bags, accessories that are required in all three environments and are too expensive to produce in the same coloration as the three separate uniforms. I initially produced the US4CES OCIE pattern shown below as our “Transitional uniform pattern” but in my own internal objective testing, it only equaled Multicam and did not surpass it. So I went back and developed the Transitional coloration and moved this one to be our OCIE gear pattern.

If the Canadian Regular Forces are looking for a third “Transitional” pattern, recoloring CADPAT to this coloration or similar offers them a royalty free solution that retains the digital pixelated effectiveness that regular forces should have, improves the NIR reflection issue substantially and provides a restricted Canadian Forces only pattern which would be difficult to mistake for another country.





Limited budgets

When I was in Bristol England for a demonstration at the British Military Headquarters, they had just decided to transition to their MTP Multi-Terrain Pattern, which is a Crye Precision developed pattern which was sold to the British Military. It combines the colors and shapes of Multicam with some of the swirl shapes of DPM (Disruptive Pattern Material). The British had a Woodland DPM and a Desert DPM which worked very well in NATO testing in their respective environments. When I questioned one of the officers responsible for the change to the MTP regarding the success of the previous DPM patterns he admitted that much of the decision came down to cost. One uniform for all environments was much cheaper than soldiers requiring Woodland and a Desert uniforms and the British Military had a very limited budget in this area. Another key issue was too many countries around the world were wearing DPM and that had caused problems with identification issues in foreign areas of operations.

British MTP camouflage below. The woodland netting and camouflage behind below left show the stark differences to the MTP colors. Image below right, two British Soldiers in MTP cleaning their weapons.

The U.S. Congress learned in 2009 that there was no testing done on the U.S. Army UCP camouflage prior to it being issued in 2004. The lack of effectiveness was not because it was a digital pattern (as many assumed) as it used the same screens as CADPAT/MARPAT/AOR1/AOR2, it was a color issue and the reason there was a color issue is that they compromised to try to create an all in one “universal” pattern using Foliage Green, Desert Sand and Urban Gray, and these colors were so different from the typical environments that I had a U.S. Military helicopter pilot tell me he could see these U.S. Army soldiers in the UCP camouflage from 5 miles away in Afghanistan but when they had to pick up the Marines, the pilots had to get them to pop smoke to find their location.

The U.S. Army themselves claimed from the testing done from 2007-2009 which demonstrated how poorly UCP was in nearly all environments that **"The data clearly show that environment-specific patterns provide the best camouflage, i.e., the lowest probability of detection, in their respective environments"**

The U.S. Army Phase IV camouflage improvement program was designed to address this with the family of patterns to utilize three separate uniform color schemes; one for Woodland, one for Desert and one for Transitional environments. Costs would be saved by issuing one uniform type for garrison wear (non-combat) and stocking in smaller numbers the other two variants which would only be issued when deployed to that specific type of region. The four finalists, (Crye Precision was one of the finalists) agreed to a flat rate royalty which would allow the government to produce as much as they wanted without having to pay a per yard royalty which the U.S. Army still does with Scorpion W2.

The only way the U.S. military can feild a new camouflage pattern is if all four branches agree to it. I was surprised when the Democrats and Republicans in 2013 agreed to the new law on camouflage uniforms just before the Army could announce the winner.

How do we expect 4 branches of the military to sit down and identify a new pattern that would meet the requirements? What are those requirements again identified by the U.S. Army Natick Lab? Three separate patterns, not one! So why are numerous countries around the world moving to one pattern? Because the U.S. Army have, and the U.S. Air Force is following the Army with the Scorpion W2 pattern and the British did…

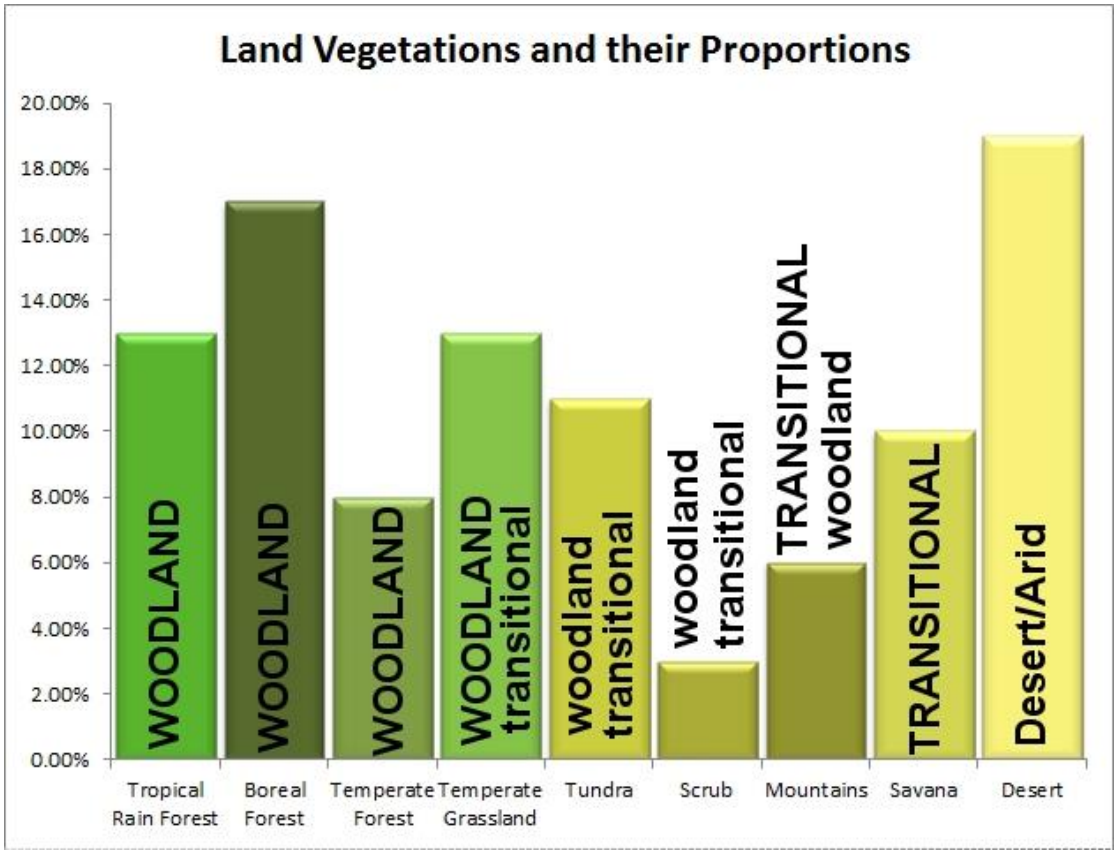
If you are operating around the world, you should have a minimum of 2 patterns, Woodland and Desert, ideally it should be 3. If you are cash strapped, then 1 may be your only option. But Canada is not in this situation and the U.S. government has asked them to spend more to meet NATO agreements.

If Canada is looking for a transitional camouflage option for the regular forces, it should be in addition to CADPAT TW and AR, not as a replacement. It should be restricted to Canadian military only and not something that is widely available. It should be objectively tested against Multicam, if that is their decided baseline and it should be effective in the NIR.

The U.S. Military has their hands tied in camouflage due to their 2013 law, no improvements are allowed until all branches agree. Canada is under no such rule and as such had the ability to capitalize on new research and development over the past decade that the U.S. military cannot.

When I developed the US4CES family of patterns for the U.S. Army, my goal was to provide the most effective camouflage based off previous research and development. I looked to learn from CADPAT TW and AR as scientifically developed and leading NATO patterns, both visually and under night vision in their respective environments.

In the table below, I show the percentage of worldwide land vegetation and their proportions as they relate to the three environments. I have identified which pattern would likely work in which environment, Capitals indicate dominant pattern for that specific vegetation, small letters indicate potential functional pattern coloration but not dominant.



The primary role of our military is defense of the country, while Canada does not have a current threat of invasion nor is there a foreseeable one in the future, this should not preclude our troops from access to effective camouflage for a key component of our landscape.

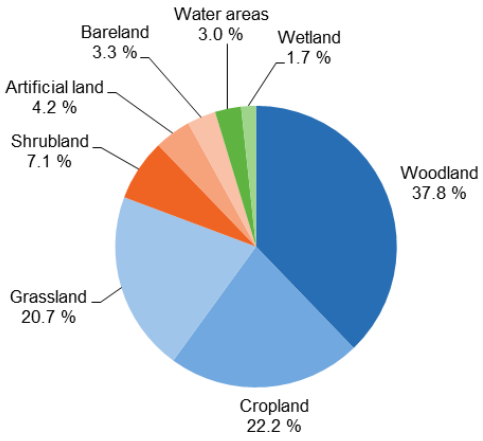
How much forest does Canada have?

Canada has 9% of the world's forests.

This amounts to 347 million hectares (ha) of forest, of which 270 million ha are boreal forest. This is enough forest to fill all of Cambodia, Cameroon, France, Germany, Italy, Japan, Nicaragua, South Korea, Sweden and Uruguay and still have enough trees left over to fill the United Kingdom.

https://www.nrcan.gc.ca/forests/report/area/17601

As part of our NATO commitment we may be called upon to defend those nations in their territory, so our camouflage should also be somewhat effective within their environments. European environments below.



Source: Eurostat (online data code: lan_lcv_ovw)

	Total area (km²)	Share of total area by type and land cover (%)				
		Woodland and shrubland	Cropland	Grassland	Water areas and wetland; bareland	Artificial
EU-28	4 369 364	44.8	22.2	20.7	8.0	4.2
Belgium	30 668	26.3	28.5	31.0	2.8	11.4
Bulgaria	110 995	46.6	29.2	18.8	3.5	1.8
Czech Republic	78 874	38.5	32.0	22.3	2.6	4.6
Denmark	43 162	20.4	50.6	17.5	4.7	6.9
Germany	358 327	34.9	32.3	21.9	3.6	7.4
Estonia	45 347	58.6	13.5	15.9	10.1	2.0
Ireland	70 601	25.3	5.8	56.3	8.8	3.8
Greece	131 912	56.7	15.3	19.4	5.1	3.4
Spain	498 504	45.7	21.3	19.0	10.6	3.4
France	549 060	33.8	28.9	26.7	5.2	5.4
Croatia	56 539	58.0	16.7	19.1	2.6	3.7
Italy	301 291	39.5	25.1	21.7	6.8	6.9
Cyprus	9 249	45.3	19.4	13.2	16.8	5.4
Latvia	65 519	55.8	14.3	22.5	5.8	1.6
Lithuania	65 412	38.7	29.4	24.9	4.2	2.8
Luxembourg	2 595	37.2	23.3	28.9	0.7	9.8
Hungary	93 013	26.0	43.7	19.9	6.4	4.1
Malta	315	19.1	26.3	23.4	7.6	23.7
Netherlands	37 824	15.0	24.2	36.3	12.4	12.1
Austria	83 944	48.3	15.3	24.7	7.4	4.3
Poland	313 851	36.7	33.2	22.6	4.1	3.5
Portugal	88 847	52.8	11.7	23.6	6.6	5.3
Romania	239 068	34.7	32.2	27.1	3.9	2.2
Slovenia	20 277	63.7	9.5	21.7	1.9	3.3
Slovakia	49 026	48.9	26.6	19.5	2.1	3.0
Finland	337 547	72.3	5.9	4.4	15.9	1.6
Sweden	449 896	69.8	4.2	5.4	19.0	1.6
United Kingdom	247 763	30.9	19.7	36.2	6.4	6.5

Source: Eurostat (online data code: lan_lcv_ovw)

http://ec.europa.eu/eurostat/statistics-explained/index.php/Land_cover_statistics

Canada does get called on by allies to support common interests in worldwide areas; such as Sierra, Afghanistan and Middle East desert type regions. It is necessary to have a go to Desert pattern as Canada does with CADPAT AR which became evident in Afghanistan when the Canadian Forces had not anticipated this combat zone and thus CADPAT AR took some time to produce enough for the troops stationed there after 2001-2002.

Providing Canada's commitment to worldwide Peacekeeping duties, it is important to have a unique camouflage which minimizes misidentification with another nation that may antagonize the situation further or draw unnecessary attention and scrutiny to our soldiers.

Sincerely,
Guy Cramer, President/CEO, Hyperstealth Biotechnology Corp.

References can be found in the following papers.

U.S. Army Phase IV Camouflage Improvement Program

by Guy Cramer, President/CEO of Hyperstealth Biotechnology Corp.

Please note that ADS Inc./Guy Cramer US4CES family of camouflage was selected as a finalist in the Phase IV program. US4CES is pronounced as U.S. Forces.

Part 1: **U.S. Army Camouflage Improvement Explained**
Part 2: **U.S. Army Scorpion Camouflage**
Part 3: **Why Not Just Use MARPAT?**
Part 4: **Why US4CES?**
Part 5 **Phase IV C3: Camouflage, Color and Cost**
Part 6: **U.S. Army Phase IV Baseline Patterns, will the Army have to settle with these?**
Special Addition: **Night Vision Device (Gen-III) comparison photos of US4CES and some of the U.S. Army Phase IV camouflage patterns**

Mexico Marines select US4CES Transitional camouflage after objective testing proves it is nearly twice as effective as their current digital pattern and Multicam.